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UNITED STATES DEPARTMENT OF AGRICULTURE • Bureau of Agricultural Economics

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Growing Broilers for Maximum Returns

By Peter L. Hansen

This article considers how producers of broilers may maximize returns above direct or cash costs. The author analyzes the effect of increased feed efficiency upon the weight to which it pays to feed broilers. His analysis indicates that the most profitable weight depends upon whether producers are interested in maximizing returns from an individual lot or from broilers raised continuously during the year. Broiler production is a conspicuous example of an industry that has adopted improved production techniques rapidly, to make possible a greatly expanded output at lower relative costs.

PRODUCTION OF BROILERS on a commercial scale is a relatively new industry in this country. Official estimates of commercial broiler production were first made by the United States Department of Agriculture for 1934. In the 18 years from 1934 to 1952 this industry increased its output from 34 million to 886 million broilers—from less than $20 million to nearly $800 million in value. This phenomenal growth was encouraged by favorable economic conditions, especially during postwar years. But the long-time expansion in broiler production as compared with other meats was due mainly to technological improvements that lowered real costs and improved the competitive position of broilers in relation to meats from other sources.

Changes in price relationships provide an approximate measure of the changing position of broilers with respect to costs of production. Average prices received by farmers for commercial broilers in relation to all meat animals were only half as high in 1950-52 as in 1935-39. Rapid adoption of technological improvements resulted in lower costs in terms of feed, labor, and other resources used to produce broilers, and made it profitable for farmers to expand broiler production with relatively lower prices.

The purpose of this paper is to indicate the extent to which these technological advances have improved the efficiency of broiler production and to suggest how broiler producers can take advantage of improvements in technology to maximize economic returns.

The improvement in efficiency that has taken place during the last 25 to 30 years may be measured by comparing the physical efficiency of feed at the beginning of this period with that found today. This can be done by comparing the input-output curves constructed from the data on consumption of feed and the corresponding gains in weight.

It is of great importance to producers of broilers to learn what effect the improvements in feed efficiency have had on the economics of broiler production. Is the level of feed efficiency an influential factor in determining the weight to which it pays to feed broilers? How is the most profitable weight affected by different price relationships for broilers and feed?

Finally, we may ask whether these changes and differences have the same effect on the efficiency of producers of commercial broilers who operate on a continuous basis as on that of producers who grow only one or two lots of broilers a year.

Feed-Production Relationship

In producing meat from broilers, as from other growing animals, the production function follows the principle of diminishing increment. The significance of this relationship is that the relative prices of feed and of broilers determine the point on the diminishing-returns curve to which it pays to feed.[1]

But, as is shown later, the weight to which it pays to feed broilers, is not the same under conditions of continuous production as it is when only an individual lot of broilers is considered.

Data showing input-output relationships for broilers at various weights are seldom available from commercial growers, and, in any case, they are limited to the first 10 to 12 weeks. It is necessary, therefore, to use experimental data although such data may not be identical with those which might be obtained on commercial broiler farms. One of the earliest experiments undertaken for the specific purpose of learning the input-output relationship in growing chickens was carried out by Jull and Titus at Beltsville in 1925.[2] This experiment was set up to test the application of the principle of diminishing increments as applied to growing chickens. A comparison of the results with those from a recent experiment may be used as a rough measure of the improvement in feed efficiency that has taken place in broiler production during the last 25 years.

The Jull-Titus experiment used 170 chicks that were hatched on April 24, 1925. The chicks were from a cross of Rhode Island Reds and Barred Plymouth Rocks. The data include weights of chicks and quantity of feed consumed at the end of each 2-week period up to 24 weeks of age. This information is available for cockerels and pullets separately. Total average consumption of feed was 10.4 pounds to bring the weight of the average broiler to 3.0 pounds. It took about 13½ weeks to reach this weight.

A comparison may be made with a recent experiment conducted by Card and Scott at the University of Illinois.[3] Card and Scott used 50 chicks of each sex from a cross of New Hampshires and Barred Plymouth Rocks. The chicks were hatched December 17, 1951. The experiment was set up to obtain data concerning weekly gains and feed consumption beyond the age at which commercial broilers usually are marketed. Data covering weekly gains and feed consumption were kept separately for cockerels and pullets. The records were discontinued at 15 weeks for pullets and 18 weeks for cockerels. The average feed consumption to a weight of 3 pounds was 8 pounds of feed, 23 percent less than was used in 1925. Moreover, this weight was reached more than 3 weeks earlier. The rapid growth obtained in the Illinois experiment is not exceptional. It is about the same as that of broilers entered in the 1951 Chicken-of-Tomorrow Contest.[4] The average feed consumption of some 16,000 broilers in that contest was 8 pounds of feed to a weight of 3 pounds at an age of 10 weeks.

The main reason for increased efficiency of feed apparently lies in the rapid growth of the broilers. The cost of body maintenance of chickens is relatively high. Large savings in the quantity of feed used for maintenance are made possible by reducing the length of time a chick needs to reach a weight of 3 pounds.

A comparison of the input-output relationship in 1925 with that found in 1952 is shown in figure 1. The 1952 curve is steeper than the 1925 curve as a result of the reduction in the quantity of feed needed for each unit of gain. The curves for both 1952 and 1925 represent an efficiency of feed above the level reached by the average grower of broilers during the respective years. The difference between the two curves may be taken as a conservative measure of the improvement in the efficiency of feed that has taken place during this period as a result of improved breeding and advances in poultry nu-

[1] SPILLMAN, W. J., and LANG, E. THE LAW OF DIMINISHING RETURNS. 178 pp. illus. Chicago, World Book Co. 1924.

[2] JULL, MORLEY A., and TITUS, HARRY W. GROWTH OF CHICKENS IN RELATION TO FEED CONSUMPTION. Jour. Agr. Research. 36(6): 541-550. March 15, 1928.

[3] CARD, L. E., and SCOTT, H. M. MAXIMIZING RETURNS IN BROILER GROWING. Paper presented at the 41st annual meeting of the Poultry Science Association, Storrs, Conn., August 12-15, 1952.

[4] SHRADER, H. L. THE CHICKEN-OF-TOMORROW PROGRAM. ITS INFLUENCE ON "MEAT-TYPE" POULTRY PRODUCTION. Poultry Science, vol. 31, No. 1, January 1952.

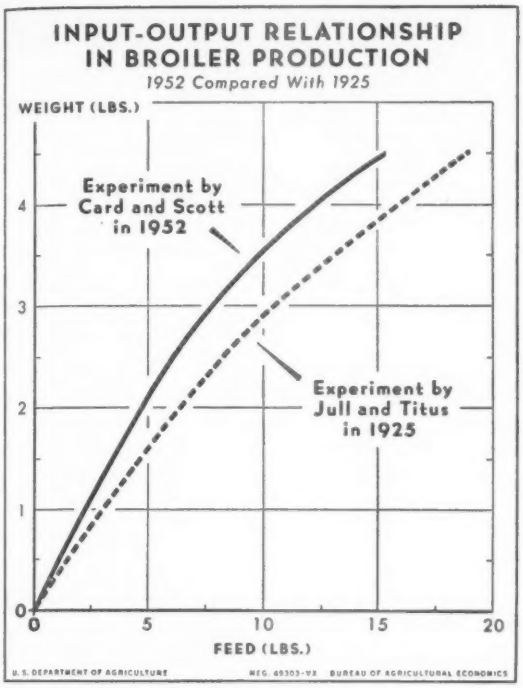

FIGURE 1.

trition. Commercial production of broilers was only beginning in 1925. Probably more growers of broilers lagged behind the experimental results in 1925 than in 1952. The effect of improved breeding on flocks in 1950 is indicated by H. L. Shrader in a recent article, from which we quote:

"There has been widespread use of the improved Chicken-of-Tomorrow breeding stock. A survey of the Chicken-of-Tomorrow contestants brought out that at least 67 percent of the commercial broiler chickens grown in 1950 carried these improved blood lines. This means that at least 400 million of the 616 million commercial broilers raised in 1950 carried some of these improved qualities. The average broiler will continue to improve as fast as the breeders can establish more multiplication flocks and complete further refinements in their blood lines."[5]

If the actual conditions that existed in 1925 and in 1952 with respect to use of feed by growers of broilers were fully known they might well show a greater improvement in the efficiency of feed for the average producer than the 23 percent shown for a 3-pound broiler in the experiments. A recent report from Virginia shows, for example, that during 1947-52 the quantity of feed used declined 23 percent and the time needed to produce broilers decreased 20 percent.[6]

Effect of Technological Improvements on Production Costs

Cost of feed represents the largest single expense in the production of broilers. Feed accounts for half to two-thirds of total costs, depending upon the level of feed efficiency and other factors. A reduction of 23 percent or more in the average quantity of feed needed to produce a 3-pound broiler is therefore of great importance so far as the competitive position of the broiler industry is concerned.

To examine what effect this improvement has had on the economics of broiler production, data from the experiments in 1925 and 1952 may be used to represent the range between an inefficient producer and a very efficient producer. The two curves in figure 1 represent the two extreme possibilities. Most producers lie somewhere between these two extremes. The average feed used for a 3-pound broiler in well-managed flocks was reported by McAllister and Bausman to be down to 9.3 pounds in 1948-49.[7] Since then the efficiency of such flocks has undoubtedly improved..

In addition to the cost of feed a producer of broilers has certain other cash expenses that must be covered before he obtains any return for his labor and fixed investment. These include the outlays for chicks, fuel, and medicine. Such costs as those of buildings, equipment, interest, and taxes must be covered over a longer period. Many costs are fixed—they go on even if no broilers are produced, once the investment has been made. Moreover, costs vary greatly among producers depending upon the type and quality of buildings and equipment used.

If broilers are produced with the use of family labor, that too takes on the nature of a fixed cost. In the Delaware study cited above, family labor accounted for 63 percent of all

[5] Ibid.

[6] KRUEGER, R. J. FIVE YEARS OF PROGRESS IN OUR VIRGINIA BROILER INDUSTRY. Va. Polytech. Inst., Dept. Agr. Econ. and Rural Sociol. Virginia Farm Economics No. 134, May 1953.

[7] MCALLISTER, W. T., and BAUSMAN, R. O. INFLUENCE OF MANAGEMENT PRACTICES ON COST OF PRODUCING BROILERS IN DELAWARE. Del. Agr. Expt. Sta. Bul. 282, January 1950.

labor used in producing broilers.[8] Even in the case of big producers who hired labor, this cost may be considered as fixed, as such labor is usually hired on a continuing or annual basis. Big producers look to the total returns for the year, for it is from these that they must pay the cost of labor before they are able to ascertain the returns on their investments.

To avoid becoming involved in the many variations in expenses incurred for labor and fixed costs among producers of broilers, the data in table 1 are set up to show returns to the operator after out-of-pocket or direct expenses such as feed, chicks, fuel, and medicine are deducted. For the purpose of presenting comparable estimates at different weights, a mortality rate of one-half of 1 percent a week was used in estimating the cost of mortality. The mortality cost represents each surviving bird's share of all the direct costs incurred by dead birds up to the time of their death.

[8] Ibid.

Maximizing Returns per Broiler

The returns per broiler at different weights are shown in table 1 for the two types of broilers considered here. The greatest return per broiler among efficient feed users is at a weight considerably above 3 pounds, both when the price is 25 cents and when it is 30 cents a pound, with feed at $5 per 100 pounds. The higher the price for broilers compared with feed, the higher the weight at which maximum return is obtained. This holds true for broilers that

TABLE 1.—*Weight cost and return per broiler, with high and low feed efficiency, at specified ages.*

Estimated age	Weight	Feed used		Cost of chicks, fuel, mortality, and medicine [2]	Return per broiler, above direct cost, when price per pound is —[3]	
		Quantity	Cost [1]		25 cents	30 cents
Days	*Pounds*	*Pounds*	*Cents*	*Cents*	*Cents*	*Cents*
			High feed efficiency			
58	2.25	5.3	26.5	21.3	8.4	19.7
62	2.50	6.2	31.0	21.6	9.9	22.4
66	2.75	7.1	35.5	21.7	11.6	25.3
71	3.00	8.0	40.0	21.9	13.1	28.1
75	3.25	8.8	44.0	22.0	15.3	31.5
80	3.50	9.8	49.0	22.3	*16.2*	33.7
85	3.75	11.0	55.0	22.7	16.1	34.8
90	4.00	12.3	61.5	22.9	15.6	35.6
96	4.25	13.7	68.5	23.3	14.5	*35.7*
101	4.50	15.4	77.0	23.8	11.7	34.2
			Low feed efficiency			
80	2.25	7.2	36.0	21.9	— 1.7	9.6
87	2.50	8.2	41.0	22.2	— .7	11.8
93	2.75	9.3	46.5	22.5	— .3	13.5
97	3.00	10.4	52.0	22.8	+ .2	15.2
101	3.25	11.8	59.0	23.1	— .8	15.4
108	3.50	13.0	65.0	23.5	— 1.0	16.5
115	3.75	14.3	71.5	24.0	— 1.8	*17.0*
122	4.00	15.8	79.0	24.4	— 3.4	16.6
127	4.25	17.3	86.5	24.8	— 5.1	16.2
132	4.50	19.0	95.0	25.3	— 7.8	14.7

[1] Cost of feed $5.00 per 100 pounds.
[2] Mortality estimated at one-half of 1 percent a week with cost of fuel, medicine, and chicks estimated at 20 cents per chick.
[3] Direct costs include feed, chicks, mortality, fuel, and medicine but not labor and fixed costs such as buildings, equipment, interest, taxes, and insurance. Cost of litter is estimated to offset value of manure.

convert feed into meat less efficiently. But for the less efficient users of feed it would not pay to continue to produce broilers with a broiler-feed ratio of 5:1 because 0.2 cents per broiler would not be a large enough return even if family labor were used. At a price ratio of 6:1 the returns above direct costs would amount to 15.2 cents per broiler at a weight of 3 pounds, and the largest return of 17 cents per broiler would be obtained at a weight of 3.75 pounds.

The assumed price relationships of 5:1 and 6:1 were chosen for this illustration because the annual broiler-feed ratio has been within this range for the last 4 years in the Delmarva area. The weekly ratio has varied erratically during each year, but it has fallen within these limits 56 percent of the weeks during these 4 years, with about as many weeks above as below.

If the broilers belong to a good meat-producing strain with high feed efficiency, the table shows that it would pay a grower of broilers using $5 feed to feed them to 3.5 pounds when the price of chickens was 25 cents a pound. It would pay to feed them to 4 or 4.25 pounds if the price was 30 cents a pound. After a weight of 3.25 pounds is reached the rate of increase in returns decreases with each additional quarter pound gain in weight. The increase per broiler is greater from 3.25 to 3.5 pounds than from 3.5 to 4.25 pounds. But in general, the higher the price of broilers compared with feed, the higher the weight of the broiler before the cost per unit of gain equals the value of the gain. This is illustrated in figure 2. Although most producers of broilers are probably not quite so efficient as the more efficient producer in this example, it seems clear from these data that it would pay them to feed broilers to more than 3 pounds under the assumed prices.

Among the inefficient broilers shown in the table the highest return with a broiler-feed price ratio of 6:1 was at a weight of 3.75 pounds. It would almost certainly pay producers whose flocks have a higher feed efficiency to feed broilers to a weight considerably above 3 pounds, that is, if they are concerned only with maximizing returns from individual lots. But this is not the case for commercial producers who operate on a continuous basis.

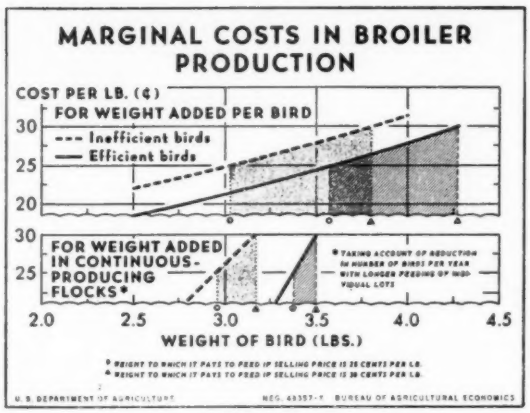
MARGINAL COSTS IN BROILER PRODUCTION
COST PER LB. (¢)
FOR WEIGHT ADDED PER BIRD
--- Inefficient birds
— Efficient birds
30
25
20
FOR WEIGHT ADDED IN CONTINUOUS-PRODUCING FLOCKS*
* TAKING ACCOUNT OF REDUCTION IN NUMBER OF BIRDS PER YEAR WITH LONGER FEEDING OF INDIVIDUAL LOTS
2.0
2.5
3.0
3.5
4.0
4.5
WEIGHT OF BIRD (LBS.)
* WEIGHT TO WHICH IT PAYS TO FEED IF SELLING PRICE IS 25 CENTS PER LB.
* WEIGHT TO WHICH IT PAYS TO FEED IF SELLING PRICE IS 30 CENTS PER LB.
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FIGURE 2.

Maximizing Annual Returns

Producers of commercial broilers with continuous production must consider another factor. If a continuous producer of broilers should keep his birds to a weight of more than 3 to 3.5 pounds (depending on efficiency), he would be likely to lose more in annual returns because of a reduction in the number of lots he could produce during a year, than he would gain by keeping the broilers to a higher weight. Highest net returns for the whole year is the goal for any producer. This goal is attainable when broilers are kept to higher weights in the case of producers who limit themselves to 2 or 3 lots a year.

Continuous producers, who allow only about 2 weeks between lots to get broiler houses cleaned and ready for the next lots, must, however, consider the possible reduction in annual returns they will incur by reducing the number of lots when they feed the broilers to higher weights. By adapting the data in table 1 to continuous production we may ascertain the age and weight at which returns are likely to be greatest for the year. This is done by adding 2 weeks to the age of broilers at each given weight, determining from this how many lots it is possible to produce a year, and computing the returns above out-of-pocket or direct cost on an annual basis.

The estimates that are shown in table 2 are based on an operating unit producing 12,000 broilers a lot. Annual returns above direct cash expenses were computed for the number

TABLE 2.—*Weight, production, and total return above direct cost of broilers, with high and low feed efficiency, at specified ages*

Estimated age plus 2 weeks	Weight	Lots per year [1]	Broilers produced annually [2]	Annual return, above direct cost, when price per pound of broilers is —[3]	
				25 cents	30 cents
Days	*Pounds*	*Number*	*Number*	*Dollars*	*Dollars*
High feed efficiency					
72	2.25	5.1	61,200	5,141	12,056
76	2.50	4.8	57,600	5,702	12,902
80	2.75	4.6	55,200	6,403	13,966
85	3.00	4.3	51,600	6,760	14,500
89	3.25	4.1	49,200	7,528	15,498
94	3.50	3.9	46,800	*7,582*	*15,772*
99	3.75	3.7	44,400	7,148	15,451
104	4.00	3.5	42,000	6,552	14,952
110	4.25	3.3	39,600	5,742	14,137
Low feed efficiency					
94	2.25	3.9	46,800	— 796	4,493
101	2.50	3.6	43,200	— 302	5,098
107	2.75	3.4	40,800	— 122	5,508
111	3.00	3.3	39,600	+ *79*	*6,019*
115	3.25	3.2	38,400	— 307	5,914
122	3.50	3.0	36,000	— 360	5,940
129	3.75	2.8	33,600	— 605	5,712
136	4.00	2.7	32,400	— 1,102	5,378
141	4.25	2.6	31,200	— 1,591	5,054

[1] Estimated number of lots of 12,000 broilers each that could be produced per year allowing 2 weeks between lots for cleaning and disinfecting broiler house and equipment.

[2] The number of broilers started for each weight would be as much higher as the mortality at that particular age required. For example, in the high feed efficiency group at a weight of 3.0 pounds it would be necessary to start (51,600 x 105) 54,180 in order to sell 51,600 broilers.

[3] Direct costs include feed, chicks, mortality, fuel, and medicine but not labor and fixed costs such as buildings, equipment, interest, taxes, and insurance. Cost of litter is estimated to offset value of manure.

of broilers that could be produced at each weight.

Estimates were made on the basis of broiler prices of 25 and 30 cents a pound. In both, feed was assumed to cost $5 per 100 pounds. This corresponds to a broiler-feed price ratio of 5:1 and 6:1, which may be accepted to represent reasonably well the range in the current normal annual relationship between broiler and feed prices.

The table shows that, within the price assumptions used, broiler producers who operate continuously by starting a new lot of broilers within 2 weeks after the sale of the preceding lot obtain their largest annual return by selling the broilers at a weight somewhere between 3.0 and 3.5 pounds, depending upon feed efficiency. This result helps to explain why, in areas in which producers operate continuously, most broilers are sold at an average weight slightly above 3 pounds.

Producers who are interested in maximizing annual net returns to management and fixed resources must pay attention to the number of broilers produced as well as to returns per bird. Total net returns, of course, are determined by number of birds and net return per bird. In table 2 net returns obtained per bird produced are not maximized at weights between 3.0 and 3.5 pounds. But by selling broilers at these weights it is possible to produce more in a year and thereby to realize larger annual net re-

turns. It should be evident, therefore, that the weight to which it is most profitable for producers to grow broilers does not depend solely upon the broiler-feed price ratio.

The marginal cost analysis, shown in the upper part of figure 2, indicates the weight to which it pays to feed broilers if maximum returns per bird is the objective. Broilers that are efficient feed converters reach a considerably higher weight than those that are inefficient, before the cost of the last pound of gain equals the price received. In the lower part of the chart (fig. 2) the marginal cost analysis is applied to continuous production of broilers. This lower segment brings out two important considerations: (1) The weight at which the average marginal cost equals the price received is lower for both types of broilers than in the segment above; (2) the marginal cost increases so sharply that the most profitable selling weight of the broilers would be increased so slightly by an increase in the price of broilers that a producer in practice could not take advantage of the change.

Many producers who grow from 1 to 3 lots a year sell their broilers at a weight of about 3 pounds, although the data presented in table 1 show that a higher return per broiler could be obtained by keeping them to a higher weight. For producers who grow only a few lots a year the length of time in itself is less significant as the broilerhouse stands empty part of the year anyway. However, with many of these farmers broiler production is a supplementary enterprise fitted into their regular farm operation and available labor supply. It may be that selling the broilers at about 3 pounds brings these farmers their largest annual returns because this is the highest profit combination for their farms.

To explain why farmers who produce less than 3 lots of broilers a year do not feed them to heavier weights, more information is needed. The supplementary nature of the broiler enterprise partly explains it, but more needs to be known about how broiler growing fits into the whole farm organization. For example, we need to know whether farmers who produce 1 to 3 lots of broilers a year follow a definite pattern each year in order to utilize available labor. It would also be useful to know whether the quantity of home-produced grain in the broiler ration used by these growers is greater than that in the ration used by other producers.

Variation in the weights at which broilers are sold in different parts of the country is apparently caused by local preferences. In New England a premium is paid for heavy broilers, which accounts for the high average weight of broilers marketed in this region, as compared with the much lower average weight of broilers in such States as Texas and Georgia. These differences in the market must be taken into consideration by producers when planning their production of broilers and deciding when to sell. An important factor in carrying broilers to higher weights is the risk resulting from a greater than average increase in cost of mortality as the broilers become larger and more valuable. Many producers may prefer to sell as soon as a market is available rather than incur additional risk that would reduce or might even wipe out their profits.

Conclusions

Data presented in this paper show that two different types of broiler producers may maximize returns above out-of-pocket costs in different ways.

A broiler producer who each year grows fewer lots than he can handle on a continuous basis would probably maximize his returns if he fed his broilers to a higher weight than the 3 pounds, which now is the national average. Efficient feed converters can be economically fed to higher weights than inefficient ones. From an economic standpoint, the weight to which both efficient and inefficient broilers can be fed varies directly with the relatively favorable or unfavorable character of the broiler-feed price ratio.

Broiler producers who operate continuously obtain their greatest annual return by producing somewhere between 3.3 and 4.1 lots a year, depending upon the feed efficiency of the birds. These producers sell broilers at an average weight of 3.0 to 3.5 pounds, most of them probably at an average close to 3.25 pounds, slightly higher than the average weight at which broilers usually are sold. It suggests that most commercial producers are feeding to a weight which gives them the greatest annual returns. The

marginal cost analysis in figure 2 shows that continuous producers cannot significantly increase their annual returns by changing the average selling weight of the broilers.

Producers of broilers may take advantage of increasing prices to obtain a larger return on an individual lot, but a continuous producer who varies his pattern of production for this purpose could easily lose as much on succeeding lots during the year as he gains on an individual lot held to higher weights. With any change in original plans, both types of producers run into practical difficulties connected with the greater space needed for larger broilers.

Methods Used in Studying Obstacles to Soil Erosion Control

By John C. Frey and Buis T. Inman

Normative economics starts with a given objective of resource allocation. A prescribed use of resources that leads to the attainment of this objective might be called an "ideal" allocation. In research it serves as a standard for comparison. There exists at any given time an "actual" pattern of resource allocation, which may or may not be the same as the ideal. When it is not the same, ways are sought to make it conform in order to achieve the expressed objective. Difficulties in changing the actual pattern of resource use to make it conform to the ideal are often called obstacles. When these difficulties are economic they are also referred to as imperfections in administration of resources. In a true research sense they are problems within a broadly conceived problematic situation, and major concern rests with their removal. They must first be accurately identified, then ways must be found to help overcome or minimize them. By so doing, recommendations can be made which, if adopted, will lead to the stated objective of resource use. The purpose of this paper is to show how the normative analysis is followed in identifying obstacles to control of soil erosion in western Iowa and in providing alternative methods for overcoming them.

IN THE APPLIED SCIENCES a meaningful objective of resource allocation needs (1) to be identified with those who wish to attain it, and (2) to be quantified in either cardinal or ordinal terms. Although it is necessary to envisage the ultimate consequences of reaching an expressed objective, there must be a point of departure based on some immediate end-in-view. Otherwise, applied scientists would direct their attention to the ultimate objectives of life itself before treating existing problems of lower order. Moreover, if the objective of resource allocation is general and vague because of lack of measurement, observable problems will be general and vague. An explicit objective is necessary to identify an explicit problem.

To ascertain some of the obstacles to soil erosion control in western Iowa, a permissible annual rate of soil loss was selected as the objective.[1] Technicians of action agencies interested in soil conservation set this rate of loss at not more than 5 tons per acre per year. They believed that if soil losses were reduced to that rate the soil productivity would be maintained or improved and the formation of gullies controlled.

The objective was physical in nature and did not guarantee desirable economic consequences. An objective of soil erosion control that also met the tests of economic desirability would have been preferred to guide the investigation, but such a standard of perfection was

[1] A report of the first phase of this study is given in Iowa Agricultural Experiment Station Research Bulletin 391, SOME OBSTACLES TO SOIL EROSION CONTROL IN WESTERN IOWA, October 1952, by John C. Frey.

not available. It must await the results of empirical research. Implicitly, technicians expected desirable economic consequences to follow the achievement of this goal. In the meantime, conservation programs in the communities were not progressing so rapidly as the leadership thought was desirable.

Because this objective was both realistic and well quantified, it was accepted for the study. Technicians were hopeful that farmers would adopt the same norm of attainment, but they varied in their willingness to do this.

The Ideal System of Erosion Control

The relative effectiveness of different farming practices in reducing soil losses and the factors that influence their use would have to be known if an ideal system of soil erosion control were to be formulated. Because many different practices are effective and many of them can be used interchangeably, there is not just one ideal system. It must be recognized that use of specified erosion-control practices means that in many instances the entire organization of a farm must be changed.

Information on factors that affect the rate of soil loss in western Iowa and the relative effectiveness of different farming practices in reducing soil losses was obtained from agronomic investigations reported by G. M. Browning and others.[2] They associated seven factors with soil losses—(f_1) soil type, (f_2) length of slope, (f_3) percentage of slope, (f_4) rotations, (f_5) management (return of crop residues and use of fertilizers), (f_6) degree of past erosion, and (f_7) supplemental practices. The following formula was set up to estimate the average annual soil loss in tons per acre:

$(f_1) \times (f_2) \times (f_3) \times (f_4) \times (f_5) \times (f_6) \times (f_7) \times (10) =$ Average soil loss in tons per acre.

A schedule of values for each factor had already been determined so that they could be substituted in the formula for any given field, and the rate of soil loss estimated. Also, given the soil type, length of slope, percentage of slope, and degree of past erosion, from a detailed soil survey, the rotations, management practices, and supplemental practices needed for a maximum soil loss of 5 tons per acre could be derived for any tract of land. Technicians used this procedure as a guide in drawing up farm plans.

The above formula was used in the obstacle study to learn the erosion-control practices necessary to meet the soil-loss objective on 144 randomly selected Iowa farms in the Ida and Monona soils area. The practices were portrayed as two plans for each farm, either of which would lead to a soil loss of 5 tons or less per acre. One plan was designed to reach this objective through practices that allowed a maximum acreage of corn. The other increased the acreage of meadow and pasture in the rotation, thus minimizing the need for terracing and contouring. Each plan included a list of the practices needed, a detailed soil map of the farm, an aerial photograph showing fields in which the practices were to be used, and an estimate of the number of acres in corn, small grain, meadow, and permanent pasture. Technicians adhered to the formula in designing the farm plans, but they visited each farm to verify the adaptability of the practices and to indicate on the aerial photograph where each practice should be used. The time and resources available limited the study to two plans for each farm.

Eight farming practices were considered in these plans — rotations, phosphate fertilizers, return of residues, terracing, contour-planting and cultivation, grass waterways, contour-fencing, and contour-listing. These were thought by technicians to be among the most important.

Generalizations for the entire study area were made possible after careful study of the two ideal systems of erosion control for each farm. For example, on 85 percent of the farms at least six different practices were needed to control erosion. Contour-planting and cultivation, grass waterways, and high-forage rotations were required on all farms, while phosphate fertilizers, terraces, and contour-fencing were needed on at least 90 percent of the farms. In order to control soil erosion, row crops

[2] See BROWNING, G. M., PARISH, C. L., and GLASS, J. A METHOD FOR DETERMINING THE USE AND LIMITATIONS OF ROTATIONS AND CONSERVATION PRACTICES IN THE CONTROL OF SOIL EROSION IN IOWA. Amer. Soc. Agron. Jour. 39:65-73. 1947. Also see Browning's Erosion Factors (Mimeo. Summary), Iowa State College, Dept. of Agronomy. 1948.

would make up only 15 to 22 percent of the total farmland, and meadow crops 37 to 43 percent.

The field data for the study were collected in 1950. The answers to questions relative to the opinions of farmers regarding practices and the extent of conservation farming reflect the conditions that existed at that time.

The Actual System of Erosion Control

To establish benchmarks for comparison, the different kinds of erosion-control practices that were in use, the type of land on which they were used, and the degree to which they were carried out according to recommended procedures, were ascertained for each sample farm. During an interview with each of the 144 farm operators, the practices in use were listed by fields on an aerial photograph of the farm. A planimeter was later used to measure the number of acres in each field so that the existing pattern of land use could be learned.

It was found that most farmers followed only one or two erosion-control practices. About half of the operators were contouring; fertilizers were used by 42 percent; a third had seeded grass waterways and were following high-forage rotations; and terracing was practiced by only 15 percent.

Farmers who were using the recommended practices did not always carry them out according to standards set by technicians. For example, some who said that they planted on the contour were not following true contour lines. Also, small earthen dams had been constructed in drainage channels instead of recommended grass waterways on 48 percent of the farms.

Lack of Conformity

Lack of conformity was rather apparent when the actual system of erosion control was compared with the ideal. The difference between the number of erosion-control practices recommended per farm and the number followed is shown in table 1.

Some erosion-control practices were used much more frequently than others. These were contouring, grass waterways, high-forage rotations, and the use of commercial fertilizers. Contour-fencing was recommended for a large proportion of the farms to facilitate contour-planting and cultivation. Only 4 percent of the operators had changed their field layouts for this purpose. Contour-listing, although generally recommended in western Iowa, was not proposed for many farms because of the two extreme types of plans used in the study. Three percent of the operators were practicing contour-listing. Attainment of the erosion-control objective under the ideal systems would require a reduction in acreages of row crops and small grains, a substantial increase in acreage of meadow crops, and a slight increase in permanent pasture.

TABLE 1.—*Number of farms on which erosion-control practices were recommended and followed, by practices per farm, on 144 farms in the Ida-Monona Soil Association Area, 1949*

Practices per farm	Farms on which recommended	Farms on which followed
Number	*Number*	*Number*
0	0	26
1	0	42
2	0	36
3	0	22
4	4	9
5	17	9
6	99	0
7	24	0

Another method used to show a lack of conformity with the ideal set up by the technicians was to compare actual erosion losses on the sample farms with the original objective of 5 tons or less per acre. To do this, values for the different practices in use were substituted in the formula for estimating annual rates of loss. Actual erosion losses ranged from 0.2 ton to 68.5 tons per acre. The average annual loss for all farms in the study was 20.8 tons. Only 11 percent of the operators had reached the erosion-control objective as of the time visited (table 2).

Casual observations alone might have convinced an investigator that soil-erosion losses were "great" in western Iowa. Yet observations do not lend themselves to scientific inquiry unless they can be weighted and recorded in proper relation to other observations. The above type of analysis sheds light on such ques-

TABLE 2.—*Number and percentage distribution of farms, by rate of soil loss, 144 farms in the Ida-Monona Soil Association Area, 1949*

Soil loss per acre	Farms	
	Actual	Percentage distribution
Tons	*Number*	*Percent*
0– 5	16	11
6–10	25	18
11–15	20	14
16–20	20	14
21–25	14	10
26–30	14	10
31–35	5	3
36–40	13	9
41–45	7	5
46–50	5	3
51–55	2	1
56–60	2	1
61 or more	1	1
Total	144	100

tions as the following: Who desires more erosion control? What amount is desired? What means can be employed to bring it about? To what extent has it not been realized? If the above methods had not been established to answer these questions, the study would have been based entirely on vague assumptions. This framework permits the identification of obstacles to achievement of the goal in soil-erosion control.

Identifying the Obstacles

It is doubtful whether any one specialist could identify or classify all of the possible obstacles to soil-erosion control. It would require an understanding of many areas of knowledge. For instance, obstacles might fall into the realm of political science, psychology, or sociology, as well as economics. The possibilities are endless. Instead of trying to ascertain all of the obstacles in a given situation, an investigator might limit his inquiry to certain ones with which he is familiar and propose these as hypotheses to be studied. Attention can then be directed toward verifying empirically the obstacles in question and learning their relative importance. Such hypothetical obstacles in controlling soil erosion were set up in the western Iowa study. The following were proposed to explain the lack of conformity previously referred to:

(1) Changes required in the livestock system
(2) Type of rental arrangement and landlord's cooperation
(3) Number of acres operated
(4) Debt position and high operating costs
(5) Price expectations
(6) Inadequacy of machinery and power
(7) Field and road layouts
(8) Short expectancy of tenure
(9) Added risk and uncertainty
(10) Inadequacy of farm buildings
(11) Influence of custom and inertia
(12) Inadequacy of the labor supply
(13) Cooperation of neighboring farmers
(14) Ability to shift erosion losses
(15) Availability of credit

These possibilities were not entirely independent of one another in an economic sense. Neither were all conceivable obstacles included. The hypotheses used in the study served only as a first approximation of some possible causes of the difficulty.

The first step in verifying these possibilities was to find out whether farmers regarded them as obstacles. To do this, each of the 144 operators was shown the ideal erosion-control plans for his farm. During the ensuing interview the operator was asked whether each of the above possibilities had kept him from following the erosion-control practices set forth in the plans and if they would continue to thwart his efforts toward erosion control. Affirmative and negative responses were recorded as well as the operator's reasons for his position. The number and percentage of the 144 operators who confirmed each area of difficulty are shown in table 3. Each hypothetical obstacle was confirmed by some of the operators.

The operator's reasons for giving affirmative answers were summarized for each obstacle tested. For example, 59 percent of the operators who confirmed the livestock obstacle said that high livestock prices prevented them from increasing their livestock numbers; and 22 percent of the operators who confirmed the rental obstacle said that their landlords would object to the smaller quantity of corn that they would receive as rent if cropland were converted to meadow or pasture. In some cases the reasons reflected distinct biases and had little value as supporting evidence.

Additional evidence in support of some of the obstacles was obtained by comparing rates of

TABLE 3.—*Number and percentage of operators confirming each hypothetical obstacle on 144 farms in western Iowa, 1949*

Hypothetical obstacles	Operators confirming each obstacle	
	Actual	Percentage
	Number	*Percent*
Change required in the livestock system.	58	40
Type of rental arrangement and landlord's cooperation.	49	34
Number of acres operated	49	34
Debt position and high operating costs.	43	30
Price expectations	39	27
Inadequacy of machinery and power.	36	25
Field and road layouts	35	24
Short expectancy of tenure	33	23
Added risk and uncertainty	27	19
Inadequacy of farm buildings.	22	15
Influence of custom and inertia.	18	12
Inadequacy of the labor supply.	13	9
Cooperation of neighboring farmers.	11	8
Ability to shift erosion losses	10	7
Availability of credit	6	4

soil loss. When farm operators said that one of the proposed obstacles had kept them from following recommendations for control of erosion, it was expected that soil losses on their farms would be relatively greater than on those of operators who gave a negative response. Actual comparisons indicated that mean soil loss was significantly greater on farms of operators who confirmed one of the following: (1) Changes required in the livestock system, (2) type of rental arrangement and landlords' cooperation, (3) debt position and high operating costs, and (4) a short expectancy of tenure.

There was reason to believe that the opinions of the operators were valid for these obstacles as differences in rates of loss were too great to be attributed to chance. But with the high degree of interdependence, the 11 other areas of difficulty could not be disregarded entirely. It appeared that further refinement in classifying and interpreting the obstacles might prove that at least some of them were closely related to the four major obstacles.

Important combinations of two or more obstacles per farm were identified in the same way. Three of the combinations and the frequency of their occurrence are shown in table 4.

Additional exploration and analysis may reveal that the rate-of-soil-loss series can be predicted from one or more other continuous series of measurable values such as number of animal units, amount of mortgage indebtedness, acres in farm, age of operator, or expected length of tenure in years. In the first phase of the Iowa study, measures were not adequate to do this as a multiple regression analysis. Averages of some values on farms with and without the obstacles did suggest significant variations. Additional investigations in this direction might be worth while.

Objections to Individual Practices

In the preceding analysis the response of farmers had reference to a complete farm plan or system of erosion control. But action agencies can benefit by finding out which practices in the plans are most objectionable to farmers. In some instances alternative practices can be devised to accomplish the same results. To shed light on this question, the 144 operators were asked to indicate the practices that they would not be willing to follow. High-forage rotations

TABLE 4.—*Number and percentage of farms, by a combination of two or more obstacles per farm on 144 farms in western Iowa, 1949*

Obstacles	Sample farms	
	Actual	Percentage
	Number	*Percent*
Changes required in the livestock system and—		
Number of acres operated per farm.	27	19
Type of rental arrangement, and landlord's cooperation.	25	17
Type of rental arrangement, landlord's cooperation, and number of acres operated per farm.	14	9

appeared to be most objectionable, followed in descending order by terracing, contouring, contour fencing, commercial fertilizers, grass waterways, and contour listing.

Reasons why farmers did not want to follow the practices were recorded and classified. Some of the reasons did not agree with the findings of physical research. In other instances farmers pointed out undesirable consequences that technicians generally recognized but did not consider so important.

The study was not designed to measure the fund of information possessed by farmers relative to controlling soil erosion, but it did point out the need for additional research on this question. It would be of value to know whether lack of technical knowledge is a major reason for the failure of farmers to control erosion, or whether some of them are well informed and still decide against it.

Another Objective Discovered

In developing the study it was thought that farmers might have an objective of soil conservation that differed from the 5-ton maximum established by technicians. They might believe (1) that their present accomplishments are adequate, (2) that less erosion control is needed than they are now accomplishing, or (3) that more erosion control is needed than they are now accomplishing. If their objectives were known, research might be directed partly toward helping them to reach what they believe is needed until the obstacles previously mentioned could be overcome.

Information obtained in the western Iowa study made it possible to ascertain this objective in each case. In the field interviews, before presenting the erosion-control plans developed by technicians, operators were asked to list the practices that they believed should be followed on their farms. When values for these practices were substituted in the formula for estimating annual rates of soil loss, the reasons for the use of erosion-control measures by farmers were measured (fig. 1). In general, farm operators wanted to reduce their soil losses further. They gave such reasons as expectation of larger crop yields, prevention of gullies, conservation of moisture, and larger farm

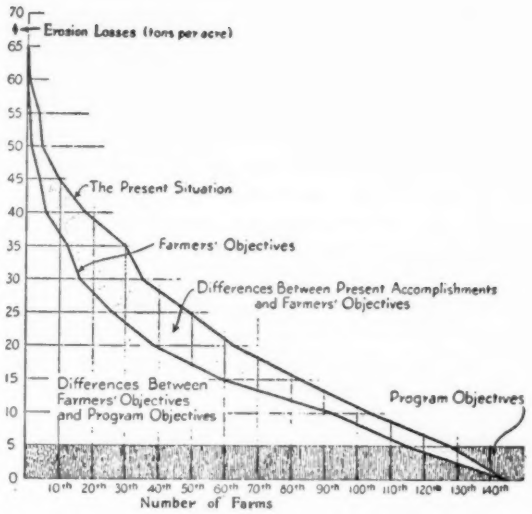

FIGURE 1.—Erosion loss on each of the 144 farms arrayed according to decreasing soil losses in tons per acre. Shown in terms of the present situation, farmers' objectives and program objectives. Ida-Monona Soil Association Area, 1949.

incomes. Only 12 percent of the operators did not envision benefits from more erosion control.

But the measures that the farm operators thought were necessary were still not sufficient to reduce soil losses to the level sought by the public agencies. It remains to be seen how static these individual objectives of erosion control are. An operator may well make a start with a few erosion-control measures and then, as he succeeds with these, recognize the additional work to be done. With a continuing process of setting up goals and making an effort to attain them, and then establishing new goals, the difference between the individual goals and the public goal could be reduced.

It appears that the task of helping farmers to overcome obstacles in achieving their own objectives of conservation would be much less difficult than the task of persuading them to go beyond to achieve the objective of public programs. Identification of the obstacles in achieving the objective of farmers should be of value to action agencies that must consider alternative ways of getting erosion-control measures adopted.

Some Suggestions for Overcoming Obstacles

Methods for overcoming obstacles must be tested and tried before they can be recommended. But this takes time. Obstacles need to be described in detail before remedial measures can be proposed, and the results of using different corrective measures will not show immediately. Identifying the general areas of difficulty is only a first step in bringing the entire process to completion.

Yet methods for obtaining more soil-erosion control often are conceived when the obstacles are being identified and described. Some farmers have been successful in reaching the public goal, and their methods can be used as hypothetical constructs of action for later investigations. If certain farm operators have worked out a solution to a particular problem which is hindering the adoption of erosion-control measures on other farms, is it possible to apply this solution to other cases?

In this study, suggestions of this nature were obtained from operators who did not have trouble with the obstacles. They told why their erosion-control accomplishments had not been retarded. Their reasons were analyzed, and from them corrective measures that might work on other farms were set forth. But a few methods were so nearly unique that general acceptance could not be expected.

Some of the changes successfully made by operators in their livestock systems were: (1) Custom-feeding livestock on pasture and pasturing cattle for others, so that losses from death, disease, or a decline in prices were shifted to cattle owners; (2) raising beef calves from breeding stock on pasture, with the alternatives of selling the calves or buying grain to feed them; (3) buying only young calves and carrying them on roughage feeds or grain-feeding them on pasture; and (4) utilizing roughages with dairy cattle, so that receipts from the dairy enterprise were forthcoming throughout the year.

Obstacles on tenant-operated farms had been overcome by (1) an adequate livestock-share lease, (2) landlords assuming most of the additional conservation costs, and (3) definite agreements whereby landlord and tenant shared the additional costs and returns.

On farms on which indebtedness and high fixed costs did not appear to be limiting factors, (1) farm-purchase loans generally had been amortized over a long period, (2) the erosion-control program had been developed over a period of years so that additional outlays were not large during any one year, and (3) financial assistance from the conservation program of the Production and Marketing Administration had defrayed part of the costs. Several tenant-operators had obtained financial assistance from their landlords under a livestock-share lease.

Tenant-operators who had a family relationship to their landlords appeared to be assured of longer tenure than average. In general, operators who owned their farms and expected an heir to take over were more interested in the future productivity of the land than were others who were not so situated. Several owners who expected to sell their farms believed that erosion control would lead to a higher selling price for the farm.

A Further Check Is Made

In an effort to discover more definitely the importance of some of the obstacle situations cited by the farm operators as reasons for not adopting cropping- and soil-management measures that would reduce soil losses, the same 144 farms visited in 1950 were revisited in the spring and summer of 1952. The four situations that were associated with the significantly greater soil losses in the first study were reexamined in greater detail. Had there been changes of any kind that affected (1) the livestock system, (2) the rental arrangement and the landlord's cooperation, (3) the debt position and operating costs, (4) the expectations of tenure, or (5) the size of the farm? Where changes had taken place since the previous survey that would tend to alleviate an existing obstacle situation, was there any evidence that a corresponding increase in the adoption of erosion-control measures had taken place? Conversely, where the situation had deteriorated, were erosion losses higher?

Preliminary analysis of the new data indicates that average soil losses have been reduced by 1.8 tons per acre annually during the 3

years. There was a tendency for farmers who had relatively low soil losses in 1949 to let their losses increase, whereas those with high losses brought about reductions. Answers to most of the above questions must await the completion of the analysis now underway.

A sample of 144 farms is relatively small. The number of changes in the various obstacle situations is likely to be too few to permit meaningful statistical testing. This is true, even though the turnover of farm operators and farm owners is comparatively great—42 changes in operators on the 144 farms during the 3 years, with a new operator each year on 2 farms and 3 different operators on each of 8 farms.

Offsetting the lack of meaningful statistical testing, however, is the information that the various case situations should yield, explaining why and how improvements in former obstacle situations have come about in individual instances, and in what way, if any, this has affected the rate of soil loss on the farm. Conversely, a study of those instances in which obstacle conditions have arisen or have become more aggravated should provide a clearer insight into the problem.

Both situations, it is hoped, will provide a test for the effectiveness of particular measures –methods of financing, the use of certain devices in leasing, changes in enterprises, modifications in Government programs, and so forth –in overcoming obstacles. The economist, who cannot manipulate groups or individuals to provide the tests and controls for the testing of his hypotheses, must learn to look for these situations when they occur.

In addition to reinterviewing the farm operators, the landlords were interviewed to complete the picture of factors that determine management decisions on rented farms.

Further study of some selected tenant-operated farms from the sample is underway. This proposes to provide information on how to overcome obstacles created by the rental arrangement—one of the four major obstacles. A budget analysis will be made of these farms and this will be compared with similar analyses of the operations on owner-operated farms where recommended practices are being followed, to learn whether the difficulties that are holding back the tenanted farms would probably be remedied under owner operation. If that is the case, an attempt will be made to discover what changes, satisfactory to both tenant and landlord, can be made in the rental arrangement to overcome this difficulty.

Although it is an advantage and a saving of research resources in a continuing line of research, such as is contemplated in the study underway, to utilize the fund of information that is being built up, it must be recognized that such a "laboratory" soon loses its representative character and becomes significantly biased. The research activity itself becomes an educational technique, and in a study in which lack of information may well be one of the difficulties, continued use of the same farm raises some real problems for the research worker.

A Critique

Development of a basic framework of analysis and empirical verification of a disparity between ideal and actual patterns of resource allocation are essential steps in the design of economic investigations that deal with applied issues. Yet some might believe that the normative framework of this study is not desirable because it is based almost entirely on physical measures. The goal is closely associated with the recommendations of action agencies and has not been tested. There is no assurance that a maximum annual soil loss of 5 tons per acre will bring about desirable economic consequences.

The weakness does not arise because the original framework starts with the objectives and recommendations of physical scientists, but because, in the progress of the study, these objectives and recommendations are not modified so that the ideal pattern of resource use is also economic. Although it appears logical to start with purely physical concepts if some relevant information on erosion control has already been ascertained, it is a serious error to accept unconditionally a maximum rate of soil loss as a final goal of land use. Every science is conditionally limited, but all knowledge is related. Once economic retardations have been ascertained, the objectives of the original

framework need to be modified so that a new ideal and one that is economically desirable, is formulated. In this way obstacle studies help to make the transition from one specialized discipline of analysis to another in the continuum of knowledge.

Without completely making the transition to economic objectives, much attention is directed toward methods for overcoming obstacles. Obstacles may appear because an attempt is made to fit a complex system of human values into a simplified analytical framework. The framework needs to expand as the study progresses. Resolving the disparity consists not only in overcoming obstacles, but in reappraising objectives as the subject matter of more and more disciplines is brought to bear on the issue. Contrasting objectives of farmers and objectives of programs is a step in this direction, but the transition still needs to be made from physical concepts to those with social implications.

In the area of delimiting obstacles, certain limitations need to be recognized. One is that the obstacles are classified into such general categories that methods for overcoming them cannot be well designed until each area of difficulty is examined further and described in greater detail. It is difficult to trace down what lies beneath each generalized area of difficulty that actually prevents operators from taking action. Additional insight might be gained by continuing with more rigorous economic analysis of individual problem situations.

An additional limitation is that lack of conformity may be due to obstacles other than those considered in the study. In fact, some of the most influential obstacles to soil erosion control may lie outside the realm of the 15 hypotheses tested. Although this is not necessarily a weakness of the study, all of the disparity cannot be attributed to the obstacles thus far uncovered. It may be useful to isolate other areas of difficulty before much emphasis is placed on remedial measures.

The major obstacles to soil erosion control are only reasonably well founded in the study underway. Evidence for them is not complete. That any hypothetical area of difficulty is truly an obstacle depends on the logical weight of supporting propositions. These have not been exhausted in the study. More objective findings might still be offered to confirm the major retardations. For example, the comparison of average soil losses on farms whose operators confirmed the obstacles, as against those of operators who did not confirm them, does not measure the intensity of the various obstacles nor conclusively prove that they do exist. It only shows that operators who expressed a certain opinion probably were not bringing about as much erosion control as others in the study who held a different opinion. This is a significant finding but it does not bring the entire analysis to an end.

Opinions of farmers have value as supporting evidence, but such convictions are subject to change. In any event, they do not always indicate the course of future actions. As in many economic studies, the subject matter may soon be out of date. And, as previously mentioned, a continuing line of research with the same respondents has very definite limitations.

There is also the danger that the interviewer will suggest obstacles during the interview or that he will ask leading questions when only a few hypothetical possibilities are being tested. The interviewing techniques used in the study do indicate that an effort was made to avoid these dangers. At the beginning of an interview the farmer was asked to give affirmative and negative responses concerning the obstacles. At its close he was given an opportunity to indicate once again which of the 15 possible obstacles, if any, actually retarded his achievements in erosion control. This procedure does not give complete assurance of objectivity but it does provide for a desirable cross check on farmer responses.

Those who might look for well-established relationships between rates of soil erosion and different economic magnitudes will not find them in the results of this study, although the budget analysis on rental arrangements discloses some information of the sort. Somehow the obstacles have not been brought into the realm of traditional economic subject matter for treatment by economic analysis. It does seem probable that economic variables might be associated in some way with losses from soil erosion. If they are, a search for some of the forces that cause these economic quantities to

change would add considerably to the analysis of obstacles and would provide the key for overcoming them. It is doubtful whether this study will actually satisfy its economic obligation until it reaches this stage of development. But in taking the first step in resolving a popular and controversial issue it does open up avenues for future research.

Pricing Milk to Farmers at Butter-Nonfat Dry Milk Plants

By Scott A. Walker

A new method of pricing milk to farmers at butter-nonfat milk plants that will reflect accurately and equitably the true net farm values of milk of various fat contents is urgently needed. On completion of a regional research study on the costs and efficiencies of 12 specialized butter-powder plants in the Pacific Northwest it became apparent to the author of this paper that such an accurate, equitable, and feasible producer pricing system could be devised.[1] The study was conducted in cooperation with the Bureau of Agricultural Economics and the Farm Credit Administration. This paper describes and analyzes the pricing plan that was developed from a detailed analysis of the physical and monetary input-output relationships in these plants. This plan is a simple and logical approach to the joint-cost problem that is so often a source of confusion in marketing studies. Essentially, it provides a formula for evaluating the differential in net farm value of milk, delivered to butter-powder plants, corresponding to differences in butterfat tests of milk. It does this in a way that gives a valid reflection of the differences in net returns from milk without involving allocations of overhead costs between the joint products. The paper is published with the approval of the Director of the Idaho Agricultural Experiment Station as Research Paper No. 368.

BUTTER WAS ONCE the principal product of the dairy industry and milk fat was the only constituent of milk that had appreciable market value. Milk plants, therefore, usually paid farmers for milk on the basis of the quantity of fat it contained. This method of paying for milk is still used by many butter-powder plants [2] in spite of the pricing inaccuracies and inequities that result from it.

A straight butterfat basis of pricing milk implies that the gross market value of the products made from milk, processing costs, and the net farm value of milk are directly proportional to the fat content. This implication is false because (1) the nonfat solids content of milk increases (and decreases) less than proportionately with an increase (decrease) in the fat content; (2) prices of butter and powder do not remain in a fixed relationship; and (3) processing costs are influenced by outputs of both butter and powder.

A specialized butter-powder plant produces two joint products. The proportions of these two products are fixed, for practical purposes, once the solids content of the milk received at the plant has been ascertained. The production theory applicable to such plants is essentially the same as for a single-product plant. This single joint-product relationship, however, presents no serious problems in the develop-

[1] WALKER, SCOTT A., PRESTON, HOMER J., NELSON, GLEN T. AN ECONOMIC ANALYSIS OF BUTTER-NONFAT DRY MILK PLANTS. Idaho Agr. Expt. Sta. Bull. 20, 1953. This bulletin reports results of research conducted under the Western Regional Dairy Marketing Project WM–1.

[2] A butter-powder plant produces butter and nonfat dry milk solids (dried skim milk in nontechnical language).

ment of a pricing formula which accurately reflects the values of both joint products and processing cost to the farm value of milk of various fat tests.

All that is required is the gross revenue function for the two products combined and the total processing cost function per hundredweight of milk received (excluding the value of the unprocessed milk). The difference between the gross revenue and the total processing costs is the net farm value, f.o.b. the plant, of milk having a fat test equal to the average test of the milk received. At any given set of prices of products and inputs these functions are essentially linear, at least within the practical range of milk-fat tests.[3] This fact greatly simplifies the construction of a feasible pricing formula for determining the absolute and relative differences in prices of milk of various fat and nonfat solids contents.

A major advantage of this technique is that it avoids the necessity of allocating either costs or revenues to either of the joint products. Such allocations usually are arbitrary and, as a result, are likely to be inaccurate. The pricing method described below which establishes differentials for milk fat on the basis of the observed relationships between total revenues and total processing costs (excluding costs of unprocessed milk) in butter-powder plants is basically accurate and economically sound.

The average net farm value of 100 pounds of milk testing 4-percent fat is computed as follows: Multiply the price of butter, f.o.b. the plant, by 1.235 and again by 4; add the price of powder, f.o.b. plant, multiplied by 8.67 and again by 0.955; and subtract the average processing costs per hundredweight of milk received. These totaled 60 cents per hundredweight in the study by Walker, Preston, and Nelson, cited above. The figure 1.235 is the average yield of butter in pounds per pound of pure fat in milk received. It is usually referred to as a butter overrun of 23.5 percent. This is the average overrun found in the 12 Pacific Northwest plants. The figure 8.67 represents the number of pounds of nonfat solids in a hundredweight of 4-percent milk as reported by Jacobson[4] and 0.955 is the yield ratio for powder determined from studies of butter-powder plant operations (and comparable to the yield of 1.235 for butter).[5]

Average total processing costs per hundredweight of milk received increase slightly as the solids content of the milk increases. This is to be expected because milk with higher solids content yields more total products per 100 pounds of milk received. In the 12 butter-powder plants studied the average increase in cost per point (0.1 percent) increase in the fat test of milk received was only 0.124 cents.

Now all of the necessary information for a complete butter-powder differential formula is at hand. The differential per point equals 0.1235 times the price of butter (f.o.b. plant) plus 0.0382 times the price of powder (f.o.b. plant) minus $0.00124.[6] This differential is then added to or subtracted from the price of 4-percent milk, as computed above, to determine the price to farmers of milk of various other milk fat tests.

A detailed study indicates that the pricing system is not basically changed by the addition of products besides butter and powder, such as cream or nonfat milk. The additional products are simply included in the total gross

[3] For a thorough analysis of the functional relationships in butter-powder processing plants see Walker, Preston, and Nelson, *op. cit.*

[4] JACOBSON, M. S. BUTTERFAT AND TOTAL SOLIDS IN NEW ENGLAND FARMER'S MILK AS DELIVERED TO PROCESSING PLANTS. Jour. Dairy Sc., 19; 171-176, 1936.

[5] Several independent studies of butter-powder plant operations which confirm the above yield and cost data are reported in the following publications:

MARCH, R. W. THE PRICING OF SURPLUS MILK IN THE CHICAGO MARKET. U.S.D.A., PMA, Dairy Branch, November 1949.

FROKER, R. K., and HARDIN, C. M. PAYING PRODUCERS FOR FAT AND SOLIDS-NOT-FAT IN MILK. Wis. Agr. Expt. Sta. Research Bulletin 143, February 1942.

FRAZER, J. R., NIELSEN, V. A., and NORD, J. D. THE COST OF MANUFACTURING BUTTER. Iowa Agr. Expt. Sta. Research Bulletin 389. June 1952.

BENDIXEN, H. A. SIMPLIFIED BUTTER COMPOSITION CONTROL. American Butter & Cheese Rev., January 1949.

MINNESOTA, DEPARTMENT OF AGRICULTURE. DAIRY AND FOOD BULLETIN OF INFORMATION, 1948.

THOMSEN, L. C. SHALL WE PLAN TOWARD CONTINUED DIVERSIFICATION. American Butter & Cheese Rev., vol. 7, No. 3, p. 74.

[6] The figure 0.0382 equals the powder yield ratio of 0.955 times 0.04 which is the increase in the nonfat solids content of milk associated with a 0.1 percent increase in the milk fat test as reported by Jacobson, *op. cit.*

revenue and gross cost figures in obtaining the price of milk of the average test of milk received. As for the price differential per 0.1 percent change in the milk fat test, the above formula applies as long as butter and powder are manufactured during the accounting period. Price relationships among manufactured dairy products remain sufficiently stable to make this practice essentially accurate and sound.

The above formulas for fixing values of milk delivered by farmers to butter-powder plants are recommended only as guides. It is recognized that short-run supply-demand conditions, particularly the pricing policies of nearby competing plants may force plant owners and managers to depart somewhat from the prices determined by these formulas. However, over longer periods, competition in the industry can be expected to force dairy plants to pay prices to farmers which are close to the net farm value of milk. The above formulas facilitate this by providing feasible, simple, and accurate means of computing these values at all times.

Changes in Farm Land Ownership

By Buis T. Inman and Hilton E. Robison

As land represents more than half of the investment in agriculture in the United States, it follows that the nature of its ownership is related to the public interest. Our national supplies of food and fiber depend upon the output of the land. Title to it confers upon the owner the right to use it as he wishes. He may let it lie idle or he may cultivate it; he may conserve it or exploit it. Also, the rights of ownership provide the basis for the sharing of its returns. Data covering the ownership of farms by operators are available from the Censuses of Agriculture as far back as 1880. But the first major study of the ownership of rented farm lands was made in 1925.[1] A much more inclusive study of ownership, for 1945, was conducted by one of the authors of the following paper and an associate.[2] In the following article, data on major types of owners in 1945 and in 1950 are compared to show the changes that occurred in the 5-year interim. The paper is based on a cooperative project of the Bureau of Agricultural Economics, and the Bureau of the Census.

SIMILAR METHODS were used to ascertain the major types of owners of farm land, together with the acreage owned by them in 1950 and in 1945. For 1950, all land in farms was classified according to type of owner by taking a sample of approximately 146,000 of the 5,382,162 farms enumerated in the 1950 Census of Agriculture. The names of farm-owner operators and landlords listed for the farms in the sample provided data as to the type of owners and the acreage held by each. For example, if the owner were a corporation, the ownership was classified as corporate. Similarly, if the owner were a person, ownership was classified as individual. The sample was a modification of one used for conducting a mailed questionnaire survey relating to farm-mortgage indebtedness. To determine the sampling rates, farms were separated into three strata, each of which was sampled separately. The strata were (1) all large farms, (2) other farms operated by the owner, and (3) other farms operated by part-owners, ten-

[1] TURNER, H. A. OWNERSHIP OF TENANT FARMS IN THE UNITED STATES. U. S. Dept. Agr. Bul. 1432. 1926.

[2] INMAN, BUIS T., and FIPPIN, WILLIAM H. FARM LAND OWNERSHIP IN THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 699. Dec. 1949.

ants, and managers. To arrive at reliable State estimates, rates of sampling each stratum were varied by States.

The sample for the owners of farm lands included 48.3 percent of all farms that were classified as large in the 1950 census. Large farms accounted for a third of all land in farms; they ranged by States from less than 2 percent of the land in farms in Ohio and Wisconsin to 95 percent in Arizona. The sample included all large farms in the 8 Mountain States and Rhode Island and a third or more of the large farms in all other States. In addition to a third of all large farms, all farms of 10,000 acres or more were included in the sample for the 3 Pacific States, North Dakota, and Florida. For South Dakota, all farms of 20,000 or more acres, and for Texas all those farms of 40,000 or more acres were included.

Of farms not classified as large, the sample included 1.8 percent of those that were operated by full owners and 2.5 percent of those that were operated by part owners, managers, and tenants. Sampling ratios of full owners varied by States from 1 percent in Ohio, Indiana, Minnesota, Missouri, Virginia, North Carolina, Kentucky, Tennessee, and Texas, to 20 percent in Rhode Island, Delaware, Wyoming, Arizona, and Nevada. The proportion of part owners, managers, and tenants ranged from 1 percent in North Carolina and Texas to 20 percent in all of New England except Maine, and in New Jersey, Delaware, Wyoming, Arizona, Utah, and Nevada.

To obtain the proportion of farm lands held by the various types of owners, the sample for each State was expanded on the basis of the sampling ratios. Land shown in the complete census enumeration as in large farms and in other farms, was then distributed in proportion to the acreages for which ownership was reported in the sample.

Land for which ownership was not reported or could not be ascertained comprised 2.8 percent of all land in the sample farms, varying from 0.4 percent in Kentucky to 6.2 percent in Texas. This acreage was distributed according to the proportion of land in each of the owner-type categories for which determination could be made.

The method of ascertaining acreage owned by type of owner for 1945 was similar to that used for 1950. A random sample was selected from each county in each State.[3] The total number of farms in the sample approximated 150,000 from the total of 5,859,169 farms enumerated. The sampling rate varied from State to State, ranging from a fifth to a sixtieth, depending on the number of farms. The purpose was to get enough owners in the sample to make reliable State estimates. Because of the greater range in size of holdings in the West, a tabulation was made from reports prepared by enumerators for all farms in the 8 Mountain States. Similarly, a tabulation was made of all farms in the census sample for Texas, which comprised all large farms and one in eighteen of all other farms in the State. If a farm was owner-operated, the acreage was tabulated by type of landlord. If more than one landlord for a farm was indicated, the acreage was arbitrarily divided equally among the landlords, as the 1945 schedule did not give the acreage rented from each landlord.

Estimates on land ownership for both 1950 and 1945 are subject to sampling errors and to errors arising from the difficulty of classifying the types of owners. In some instances, the landlord reported by the farm operator may not have been the owner; he may have been the agent for a corporation or he may have rented from a corporation and subleased to the farm operator. Moreover, when the name of a firm, or the name of a farm or ranch was given, it was not always possible to classify the land properly as to whether it was corporately owned. Minor differences in percentages are therefore not significant; they do not indicate changes in land held by different types of owners.

Many factors have combined to determine the present ownership pattern of our farm land. Title to all the land in this country was at one time held by the Federal Government with the exception of the land which comprised the Thirteen Original Colonies and Texas and appropriated lands in the other territories at

[3] This sample was originally prepared as a mailing list for the national land ownership study. For a report of this study, see INMAN, BUIS T., and FIPPIN, WILLIAM H. FARM LAND OWNERSHIP IN THE UNITED STATES. U. S. Dept. Agr. Misc. Pub. 699. Dec. 1949.

the time of their acquisition. Disposal of the public domain through homesteading, sales, and grants to railroads and to States, had a marked effect on the pattern of ownership. Some lands, because of their low productivity or because they were required for special uses such as watershed protection, were retained in or reverted to public ownership, or were acquired by public agencies.

Economic conditions exerted a strong influence on the proportion of the farm land in private, corporate, and public ownership. Influential in determining the pattern of ownership were credits made available to farmers by private lenders and State and Federal agencies. State and Federal programs were developed to promote land ownership by farm operators. Another influence in this direction was State laws that regulated corporate ownership.

Types of Owners

Owners of farm land in the samples for the 1950 and 1945 censuses were classified into four major types, based upon the names appearing on the census questionnaires. These were individual, corporate, Indian, and public.

INDIVIDUAL—If the census questionnaire indicated that land was owned by one or more persons, owners were classified as individual. Individual owners included one person, husband and wife, partnerships, undivided interests or estates, and life estates.

Farm land in the United States is largely held by individuals. Approximately 88 percent of the land enumerated in farms in the 1950 and 1945 Censuses of Agriculture was owned by individuals (tables 1 and 2). In 1950, 56 percent of the land was owner-operated, and in 1945, 53 percent. Ninety-eight percent of the farm land in the States east of the 100th meridian was owned by individuals, but only 81 percent in the 17 Western States. Florida was the only eastern State in which individuals held less than 90 percent of the farm land in both years. About one-fifth of the land in Arizona was held by individuals, the lowest proportion of any State.

Significant increases in individual ownership occurred in the West North Central States in the 5 years. This is accounted for by the disposal of lands held by loan and investment companies and of tax-reverted lands acquired before 1945 by State and local governments.

CORPORATE OWNERSHIP—If the name on the census questionnaire indicated that a company owned the land, ownership was classed as corporate. Corporate holdings in both 1945 and 1950 represented approximately 4.5 percent of the farm and ranch land of the country. They were most prevalent in the Western States and in Florida. Hired managers operated much of this land, especially that used for ranching or for production of fruits and vegetables.

Corporate holdings declined appreciably in some States during the 5 years. The decline was pronounced in the West North Central States, particularly in North Dakota and South Dakota, owing to the liquidation of holdings acquired by loan and investment companies through forfeiture and foreclosure during the depression of the 1930's. Corporations in the 1930's, for example, held 12 percent of the farm land of Iowa and North Dakota.[4] In many States, legislation which limited the time that corporations can hold land or the acreage they can hold forced some loan and investment companies to dispose of their lands. However, rising land values were a more significant influence in the decline in holdings of this type of corporation.[5] By 1950, loan and investment corporations owned only 0.2 percent of the farm land in the country.

Farming and ranching companies owned 2.2 percent of the farm land in 1950. The holdings of this type of corporation appear to be on the increase, particularly in Florida and California. In these States large acreages are devoted to the production of fruits, vegetables, cotton, sugarcane, and grazing. Ranching companies are prevalent throughout the 17 Western States and Florida. Other profit corporations, such as real estate, timber, mineral, and railroad companies, owned almost 2 percent of the farm

[4] WILNER, STANLEY, and SCHAFER, RAYMOND L. STATISTICAL ANALYSIS OF LAND OWNERSHIP IN NORTH DAKOTA IN 1925. N. Dak. Agr. Expt. Sta. March 1939. MURRAY, WILLIAM G. CORPORATE LAND, FORECLOSURES, MORTGAGE DEBT AND LAND VALUES, IOWA, 1939. Iowa Agr. Expt. Sta. Res. Bul. 266. 1939.

[5] TIMMONS, JOHN F., and BARLOWE, RALEIGH. FARM OWNERSHIP IN THE MIDWEST. Iowa Agr. Expt. Sta. Res. Bul. 361. June 1949.

and ranch land. They seldom farm the land they own; they usually lease it out for farming and ranching.

In the Eastern States, most of the relatively small acreage of corporate land in farms is held by industrial companies. They may hold the land for the minerals, timber, plant sites, or for other reasons. Few of these companies attempt to farm or graze their land.

INDIAN LANDS.—The acreage of farm land under Indian ownership represents Indian reservation lands under Federal jurisdiction. State Indian reservation lands are included under State ownership. For 1950, lands owned by Indians include both tribal lands and lands under individual allotment. For 1945, lands allotted to individual Indians and so reported to census enumerators were classified as individually owned.

In both 1950 and 1945 most of the Indian-operated lands—about 90 percent in 1950—were reported to the census in the name of coopera-

TABLE 1.—*All land in farms and percentage distribution by type of owner, by States, 1950*

State, division, and region	All land in farms	Type of owner					
		Individual, partnership, and estate	Corporation	Indian [1]	Public		
					Federal	State and local	Total
	1,000 acres	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Maine	4,182	99.3	0.5			0.2	0.2
New Hampshire	1,714	98.6	.6		0.1	.7	.8
Vermont	3,527	99.0	.7			.3	.3
Massachusetts	1,660	95.2	3.8		.1	.9	1.0
Rhode Island	191	93.7	5.2			1.1	1.1
Connecticut	1,272	95.8	3.1		.2	.9	1.1
New England	12,546	98.1	1.4		[2]	.5	.5
New York	16,017	98.9	.8			.3	.3
New Jersey	1,725	95.3	4.2			.5	.5
Pennsylvania	14,113	98.2	1.2		.3	.3	.6
Middle Atlantic	31,855	98.4	1.2		.1	.3	.4
Ohio	20,969	99.1	.5		.2	.2	.4
Indiana	19,659	98.6	1.0		[2]	.4	.4
Illinois	30,979	98.5	1.2		.1	.2	.3
Michigan	17,270	99.0	.6		.1	.3	.4
Wisconsin	23,221	98.9	.9	[2]	.1	.1	.2
East North Central	112,098	98.8	.9	[2]	.1	.2	.3
Minnesota	32,883	99.0	.8		[2]	.2	.2
Iowa	34,265	99.1	.7			.2	.2
Missouri	35,123	98.9	.7		.3	.1	.4
North Dakota	41,194	93.9	1.2	1.3	1.1	2.5	3.6
South Dakota	44,786	85.1	1.2	7.4	2.0	4.3	6.3
Nebraska	47,467	94.7	2.6	.2	.5	2.0	2.5
Kansas	48,611	98.7	1.1	[2]	.1	.1	.2
West North Central	284,329	95.3	1.2	1.4	.6	1.5	2.1
Delaware	851	97.9	2.0		.1		.1
Maryland	4,056	97.8	1.9			.3	.3
District of Columbia	1				100.0		100.0
Virginia	15,572	98.8	.8		[2]	.4	.4
West Virginia	8,215	98.7	1.3				
North Carolina	19,318	99.2	.5	.1	[2]	.2	.2
South Carolina	11,879	97.4	2.2		.1	.3	.4
Georgia	25,751	97.1	2.5		.2	.2	.4
Florida	16,528	82.1	14.5	.5	1.1	1.8	2.9
South Atlantic	102,171	95.5	3.6	.1	.3	.5	.8

Continued

TABLE 1.—*All land in farms and percentage distribution by type of owner, by States, 1950 —Continued*

State, division, and region	All land in farms	Type of owner					
		Individual, partnership, and estate	Corporation	Indian [1]	Public		
					Federal	State and local	Total
	1,000 acres	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Kentucky	19,442	99.0	.4	----------	.5	.1	.6
Tennessee	18,534	98.9	.6	----------	.3	.2	.5
Alabama	20,889	98.0	1.2	----------	.3	.5	.8
Mississippi	20,711	97.6	1.4	----------	.2	.8	1.0
East South Central	79,576	98.4	.9	----------	.3	.4	.7
Arkansas	18,871	98.1	1.4	----------	.2	.3	.5
Louisiana	11,202	91.8	7.2	----------	[2]	1.0	1.0
Oklahoma	36,007	95.5	.9	1.2	.5	1.9	2.4
Texas	145,389	90.7	6.8	[2]	.4	2.1	2.5
West South Central	211,469	92.3	5.3	.2	.4	1.8	2.2
Montana	59,247	76.7	6.1	7.9	3.2	6.1	9.3
Idaho	13,224	86.2	2.4	2.2	1.8	7.4	9.2
Wyoming	34,421	62.4	15.0	6.7	7.9	8.0	15.9
Colorado	37,953	85.1	6.2	2.2	1.4	5.1	6.5
New Mexico	47,522	56.6	8.7	14.0	6.5	14.2	20.7
Arizona	39,916	20.6	10.4	49.7	5.7	13.6	19.3
Utah	10,865	71.0	13.8	7.0	.5	7.7	8.2
Nevada	7,064	52.8	32.8	13.3	.6	.5	1.1
Mountain	250,212	62.8	9.4	14.5	4.3	9.0	13.3
Washington	17,369	89.1	4.3	1.3	2.6	2.7	5.3
Oregon	20,328	90.3	5.6	1.1	1.5	1.5	3.0
California	36,613	83.7	11.8	.5	2.6	1.4	4.0
Pacific	74,310	86.8	8.3	.9	2.3	1.7	4.0
East	470,590	97.8	1.7	[2]	.2	.3	.5
West [3]	687,976	81.1	6.2	6.0	2.2	4.5	6.7
United States	1,158,566	87.8	4.4	3.6	1.4	2.8	4.2

[1] Indian lands under Federal jurisdiction

[2] Less than 0.05 percent.

[3] North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

tive groups. In some instances an entire reservation was reported as one farm. Indian land is used by the tribes or leased, primarily for grazing. Large tracts of Indian reservation lands reported as not used for crops or grazing were not included by the census as land in farms. Farm lands operated by Indians, either individuals or tribal groups, amounted to 36 million acres in 1950, according to the census. In addition to land owned and operated by Indians this included land rented by Indians from others. The total farm land owned by Indians in 1950, as estimated in this study, amounted to approximately 41 million acres. Thus, a minimum of 5 million acres of Indian-owned land was in farms of non-Indians.

The increase in the proportion of farm land owned by Indians from 1945 to 1950 reflects an increase of 6 million acres of Indian-owned land in farms. Most of the increase was in Arizona, Montana, New Mexico, South Dakota, Utah, and Wyoming. Some of it was due to differences in classification but most of it represents increases in the acreage reported to the census. Not all of the increase in acreage represents increase in agricultural use of the land. Most of it was reported to the census in 1949 as land pastured or grazed. Much of this land,

however, has a very low carrying capacity and may not have been reported in 1945. Although census enumerators in 1945 were instructed to include "unfenced grazing land over which reservation livestock is herded," they were told not to include "any vast acreage of wild land not utilized to any appreciable extent."

PUBLIC OWNERSHIP.—Publicly owned lands in 1950, comprising Federal, State, and local government holdings, represented more than 4 percent of the land in farms. Neither the large acreages of public land grazed under permit nor lands not used for agriculture were enumerated by the census as land in farms.

TABLE 2.—*All land in farms and percentage distribution by type of owner, by States, 1945* [1]

State, division, and region	All land in farms	Type of owner			
		Individual, partnership, and estate	Corporation	Indian	Public
	1,000 acres	*Percent*	*Percent*	*Percent*	*Percent*
Maine	4,613	98.7	0.5		0.8
New Hampshire	2,017	99.0	1.0		[2]
Vermont	3,931	99.2	.8		
Massachusetts	2,078	98.6	1.2		.2
Rhode Island	265	89.7	6.3		4.0
Connecticut [3]	1,593	98.1	1.7		.2
New England	14,497	98.6	1.0		.4
New York [3]	17,568	96.0	3.9		.1
New Jersey	1,818	96.2	3.0		.8
Pennsylvania	15,020	98.7	1.0		.3
Middle Atlantic	34,406	97.2	2.6		.2
Ohio	21,928	98.9	.5		.6
Indiana	20,027	98.6	.5		.9
Illinois	31,602	98.5	1.4		.1
Michigan	18,392	99.5	.4		.1
Wisconsin	23,615	98.0	1.5		.5
East North Central	115,564	98.7	.9		.4
Minnesota	33,140	97.3	2.0		.7
Iowa	34,454	97.9	1.9		.2
Missouri	35,278	98.6	1.2		.2
North Dakota	41,001	89.3	4.1	0.8	5.8
South Dakota	43,032	75.0	4.0	6.3	14.7
Nebraska	47,753	95.4	2.3	.1	2.2
Kansas	48,589	97.9	2.0		.1
West North Central	283,247	92.8	2.5	1.1	3.6
Delaware	923	98.8	.9		.3
Maryland	4,200	98.5	.8		.7
District of Columbia	2	23.4			76.6
Virginia	16,358	99.7	.1		.2
West Virginia	8,720	96.9	2.6		.5
North Carolina	18,618	98.9	1.0		.1
South Carolina [3]	11,022	96.3	2.2		1.5
Georgia	23,676	95.7	3.9		.4
Florida	13,083	89.2	10.6		.2
South Atlantic	96,602	96.4	3.2		.4

Continued

TABLE 2.—*All land in farms and percentage distribution by type of owner, by States, 1945* [1] *Continued*

State, division, and region	All land in farms	Type of owner			
		Individual, partnership, and estate	Corporation	Indian	Public
	1,000 acres	*Percent*	*Percent*	*Percent*	*Percent*
Kentucky	19,725	98.1	1.4		.5
Tennessee	17,789	99.5	.4		.1
Alabama	19,068	99.2	.5		.3
Mississippi	19,617	98.5	1.2		.3
East South Central	76,199	98.8	.9		.3
Arkansas	17,456	97.7	2.0		.3
Louisiana	10,040	93.5	6.3		.2
Oklahoma	36,162	94.1	.8	1.9	3.2
Texas [3]	141,338	90.8	7.8	[2]	1.4
West South Central	204,996	92.1	6.0	.3	1.6
Montana	58,787	76.8	6.9	6.1	10.2
Idaho	12,503	90.0	1.0	3.6	5.4
Wyoming	33,117	68.7	13.6	3.7	14.0
Colorado	36,218	88.1	4.2	1.8	5.9
New Mexico	49,608	51.2	7.7	11.7	29.4
Arizona	37,856	23.7	13.2	47.1	16.0
Utah	10,309	80.7	8.3	3.3	7.7
Nevada	6,178	52.7	31.0	15.1	1.2
Mountain	244,576	64.2	8.9	12.6	14.3
Washington	16,720	90.0	3.8	1.5	4.7
Oregon	19,754	89.8	6.9	.2	3.1
California	35,054	92.1	5.6	.4	1.9
Pacific	71,528	91.0	5.5	.6	2.9
East	467,636	97.9	1.8		.3
West [4]	673,979	80.8	6.4	5.3	7.5
United States	1,141,615	87.9	4.5	3.1	4.5

[1] Indian lands under Federal jurisdiction.
[2] Less than 0.05 percent.
[3] Ownership data revised.
[4] North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

Most publicly owned lands in farms are unappropriated Federal, State grant, and tax-reverted State and county lands. Approximately 95 percent of these publicly owned lands are in the 17 Western States, where they are used principally for grazing because rainfall limits their use for crop production. In 1950, a third of these public lands in farms were owned by the Federal Government, and two-thirds by State and local governments.

Declines in the acreage of publicly owned land in farms occurred almost entirely in North Dakota, South Dakota, and New Mexico. In the Dakotas, large acreages of tax-forfeited lands were returned to the tax rolls as they reverted from State to private ownership.

In New Mexico, publicly owned land in farms declined from 29.4 to 20.7 percent, or approximately 4.7 million acres, owing primarily to differences in reporting such lands to the

census. Some misunderstanding may have arisen because of confusion as to the distinction between leased and permit grazing land. Lands leased for grazing were to be included; lands grazed under permit were not to be included.

Some of the increase in publicly owned land in farms in the Western States resulted from the addition of 1.7 million acres of land administered under the Taylor Grazing Act and leased for grazing between 1945 and 1950.[6]

There was a slight increase in the acreage and percentage of land in public ownership in the 31 Eastern States, the result, apparently, of additional leasing of publicly owned lands, such as military reservations, for farming and grazing. This increase, combined with the decline in acreage of privately owned land, raised the proportion of land in public ownership.

[6] From reports of the Secretary of Interior for 1945 and 1950.

A mimeographed index for volume 5 is now available upon request

Book Reviews

A Guide to Keynes. By ALVIN H. HANSEN. McGraw-Hill Book Company, New York, 1953. 237 pages. $3.75.

ALTHOUGH the so-called Keynesian controversy is still alive, it has at least moderated to the extent that the stature of Keynes as an economist is now recognized and his *General Theory of Employment, Interest and Money* is numbered among the classics with which all serious students of economics should have some first-hand acquaintance. Unfortunately, the *General Theory,* which Keynes addressed to his fellow economists, is difficult reading and is organized in such a way as to limit its usefulness as a text. As a result, there have been a number of attempts to restate the *General Theory,* in whole or in part, such as Lerner's *Economics of Employment,* which presents the essentials of the Keynesian system in nontechnical language, and Dillard's *Economics of John Maynard Keynes,* which is a systematic exposition on the advanced textbook level. Books of this type are indeed useful, but they are not complete substitutes for the original.

Professor Alvin Hansen of Harvard University, whom the editor of the McGraw-Hill Economic Handbook Series accurately describes as "the most prominent Keynesian in the United States," has now provided a book specifically designed to aid and induce the reading of the *General Theory* itself. The prospective reader should be forewarned that Hansen's *Guide* does not provide the casual browser with an easy tour through the realms of Lord Keynes. It is designed for the diligent reader who seeks not only a firm grasp of the Keynesian system as such, but also an understanding of its relation to the contributions of others, including J. M. Clark, D. H. Robertson, Wicksell, Pigou, and Hicks.

The *General Theory* contains 24 chapters. Adhering to the general sequence followed by Keynes, Hansen has grouped them under 12 topics, on each of which he provides a chapter of commentary. These chapters follow no fixed pattern. Each contains the particular type of material which Hansen believes will best serve to illuminate the topic covered.

This unusual volume is not one that can be readily summarized. In lieu of this, a few items have been selected which I hope are fairly representative of its content.

The first part of chapter 1 contains an essay —which is truly a gem—covering the pre-Keynesian dissenters from the orthodox views concerning the self-adjusting properties of the economy, the influence of Say's law on business-cycle analysis, and the position of Pigou, whom Keynes singled out as his special adversary at the very beginning of the *General Theory.*

Chapter 2 disposes of the troublesome wage-unit problem by showing that Keynes could have carried out his analysis equally well by using a general price index instead of the wage unit to deflate his variables; and contains a clarifying statement of the difference between an equality of savings and investment and an equilibrium between them. Chapter 4 presents helpful graphic illustrations of multiplier effects under different assumptions as to "leakages;" and also elaborates Keynes' sketchy treatment of certain different concepts of the multiplier.

Chapter 7 reveals the inadequacy of Keynes' formulation of the theory of interest-rate determination; and provides a more comprehensive formulation which goes a long way toward reconciling the Keynesian money supply-liquidity preference theory, the loanable funds theory, and the classical theory of the demand for and supply of savings. Chapter 10 further explores the relation of wage flexibility or rigidity to changes in aggregate demand. Chapter 12 discusses the difference between the relation of money to prices as explained by the standard quantity theory and the relationships involved in the Keynesian theory.

Professor Hansen states that "this book is intended primarily for students majoring in economics and for first-year graduate students," but I think it will prove extremely valuable to anyone who wants to gain a thorough understanding of the Keynesian schema, together with an appreciation of its accomplishments and limitations. Although I find this book very much to my liking (perhaps I am unduly influenced by its obvious usefulness in my annual efforts to expound Keynes to graduate students), this does not mean that it is without flaw. For example, I think that the distinction between equality and equilibrium of saving and investment in chapter 2 could be more thoroughly demonstrated; and that the discussions of "The Role of Money Wages" in chapter 10 and "The Keynesian Theory of Money and Prices" in chapter 11 are not as successful in clarifying the issues involved as are some of the other chapters.

James P. Cavin

E. A. Stokdyk—Architect of Cooperation. By JOSEPH G. KNAPP. American Institute of Cooperation, Washington, D. C. 1953. 229 pages. $3.

TO EVALUATE THIS BOOK one must judge it in the light of its purpose. This is best set forth by the author on page 1, under the heading "A Personal Word." He asks:

"Who was Stokdyk? What was he like? What did he stand for? This volume attempts to answer these questions. It is not a psychological essay. . . . It is based on the record of what Stok . . . said and did, and on the memories of those who shared life with him. . . . This, then, is really the object of this book: To capture some of the spirit, charm, and purpose of this unique personality so that we may get the full benefit from the lessons of his life."

In a strict sense, this is not a biography, although it has many attributes of one. Rather, it is the story, and to some extent an interpretation, of the professional years of E. A. Stokdyk—years largely devoted to the development of cooperative marketing and purchasing in agriculture. The author does succeed in capturing "some of the spirit, charm, and purpose" of a many-sided and talented figure who sought to build and improve. Helpful in this respect are the four pages of photographs that depict some of the highlights of Stokdyk's life.

Roughly the first half of the book is devoted to the origin and evolution of a train of thought which culminated in the California Agricultural Prorate Act and which still later gave rise to marketing agreements under Federal legislation. Stokdyk was a notable leader in the effort to enable agricultural producers to conduct orderly marketing with the assistance of the trade and Government, and his faith and untiring effort helped to translate the idea into reality. These particular chapters of the book are significant, both because of their revelation of Stokdyk and the role he played, and because of their historical references.

The latter half of the book is built around specific phases of Stokdyk's work—particularly in the fields of cooperative law, teaching, research—and of his contributions as statesman and advocate. Taken together, these chapters reveal both the ability of the man and the scope of his talents and interests.

In addition to the story told by the author, the book contains the text of a dozen selected articles written by Stokdyk between 1932 and 1945. These relate to widely different subjects, although most of them pertain to farmer cooperatives and deal with such topics as management, public relations, finance, and policy formulation. These articles are followed by a complete bibliography of the several score of articles, pamphlets, and books written by Stokdyk during the quarter century 1921-46.

The Stokdyk personality was a happy mixture of the "human" traits and those of the

intellectual and the objective scholar. This reviewer knew him for a decade and had frequent contacts with him, although they were not as intimate as those of the author. This book presents a good word picture of the man himself.

In some respects, however, this word picture is not complete. The author has selected and emphasized the positive and successful phases of Stokdyk's efforts. The book passes over very lightly the failures and disappointments which characterize every life and often provide the basis for an individual's successful career. Also, there is little evaluation of the importance of Stokdyk's work in relation to the total work done in a given field. The result is a not too clear perspective of the relative importance of Stokdyk's work, as, for example, in the effort to amend the law to permit retirement of Government capital in the Banks for Cooperatives, and in efforts in the field of public relations.

Whatever shortcomings the book may have, it still does justice to the memory of a departed friend. There may be some who will feel that in the latter chapters the author injects more of himself than he should in a book of this character. This, however, is excusable on the grounds of an acquaintance that ripened into a long and close friendship.

Regardless of any criticism that may be made, this book is a notable contribution because of the biographical material it contains and because of its economic significance. The author is to be commended for his work in producing the book on his own limited free time and without any compensation other than that derived from the joy and satisfaction of the work itself. *John H. Davis*

A Textbook of Econometrics. By LAWRENCE R. KLEIN. Row, Peterson and Company, Evanston, Illinois. 1953. 355 pages. $6.00.

Studies in Econometric Method. Edited by WM. C. HOOD and TJALLING C. KOOPMANS. Cowles Commission for Research in Economics. Monograph 14. John Wiley & Sons, Inc., New York. 1953. 324 pages. $5.50.

WORKING TOOLS FOR ANALYSTS who wish to use the simultaneous equations approach are provided by these volumes. Klein's book presumes only a knowledge of calculus. The monograph issued by the Cowles Commission presumes a knowledge of matrix notation and manipulation but explains many other mathematical concepts in the text or in footnotes. Klein's book has the advantage of being written as a text, so that each new subject is related directly to those presented in preceding chapters, and the entire book covers all major concepts in the field. Monograph 14 brings together several closely related research papers that have been published elsewhere, and fills in the gaps with new material.

Chapter II of Klein's book gives a summary of those parts of probability and statistics that are essential to a comprehension of econometrics, and an appendix includes important definitions and theorems that apply to matrices and determinants. In the preface Klein states, "No attempt is made at mathematical rigor. On the contrary, an intuitive approach is used throughout and interspersed with literary explanation to make the subject as understandable as possible." On the other hand, the reader is fully aware that the results given are based on a rigorous mathematical approach.

Chapter I of the Klein book outlines some basic principles that relate to econometrics. It states, "The purely theoretical approach to econometrics may be envisioned as the development of that body of knowledge which tells us how to go about measuring economic relations. . . . The empirical work in econometrics deals with actual data and sets out to make numerical

estimates of economic relationships. . . . Econometrics is a way of studying history—a very systematic way. We never know what economic behavior will be like in future, unobserved situations, but we try to make as strong a statement as possible about this unknown area on the basis of past history. . . . A sensible method of extrapolation (or forecasting) is not naive or mechanical, and the econometrician is no less flexible than any other historian who tries to evaluate the future on the basis of the past. Even without the attempts at extrapolation, however, econometrics is interesting as a mere study of the past to show how quantitative magnitudes interacted at that time."

This approach is outlined in more detail in a later part of the chapter. Klein states, "There is no unique way of constructing equation systems to describe economic behavior. . . . For any given hypothesis, the relevant empirical data are examined to see whether or not this hypothesis is acceptable. Hypotheses which are inconsistent with the sample observations, in a statistical sense, will be rejected as unacceptable. Those which are consistent will be tentatively accepted. If all but one were rejected, we could accept that one as our definite hypothesis, but experience has shown that the sample data usually employed in econometrics are consistent with a variety of hypotheses. The acceptable group is continuously narrowed down by extrapolation of estimated equations to observations beyond the sample point and repeated examination of independent samples of data. Those equations which do not extrapolate well outside the sample or those which do not stand up under repeated estimation in independent samples are gradually rejected." Such a view is reassuring to analysts who have worked mainly in applied fields.

After laying out the econometric and statistical groundwork, Klein considers problems of estimation for aggregative models. He discusses the special case for which maximum likelihood and least-squares estimates coincide, and then considers general problems of identification, showing how maximum likelihood and limited information methods can be used in the over-identified case. Efficient methods of computation are described in the following chapter, as applied to least squares, maximum likelihood, and limited information estimates, using desk calculators, regular I.B.M. equipment, or the Card Programmed Electronic Sequence Computer.

Methods of sector analysis are discussed next. The sectors may be individual consumers, firms, industries, or geographic regions or countries. Input-output studies are discussed as one example in this field. In some instances, a single sector may be studied in detail and then be "grafted" onto an aggregative model by one or two equations to form a complete self-contained system. Methods for pooling time series and cross section data are considered, and formulas are presented that show the relation between estimates derived from these two types of data under specified assumptions.

Principles and techniques of prediction, and special problems involving errors of observation and measurement and varying lengths of observation periods are then considered. An example shows the exact effect on the number of degrees of freedom in using quarterly data versus annual data in a particular problem under various assumptions regarding the degree of lag and of serial correlation in the residuals.

Ten papers are included in the Cowles Commission monograph. Jacob Marschak, writing on "Economic Measurements for Policy and Prediction," gives an illuminating discussion of changes in structure as they affect the need for specifying a complete model. Jean Bronfenbrenner, in a paper entitled "Sources and Size of Least-Squares Bias in a Two-Equation Model," illustrates both algebraically and graphically several clear, simple examples that show the source and size of bias that may occur if individual equations of a simultaneous equations model are fitted directly by least squares. Herbert A. Simon presents diagrams in connection with certain simultaneous equation systems which are pictorially similar to the "path coefficient" diagrams used by Sewall Wright in the early 1920's. The subject of the Simon article is "Casual Ordering and Identifiability." Reprints of Koopmans' paper on "Identification Problems in Economic Model Construction," Trygve Haavelmo's "Methods of Measuring the Marginal Propensity to Consume," and "Statistical Analysis of the Demand for

Food" by M. A. Girshick and Haavelmo are included. Other papers by Koopmans, Hood, Herman Chernoff, Herman Rubin, S. G. Allen, Jr., and Nathan Divinsky deal with mathematical and statistical problems involved in the estimation of simultaneous relationships, including 30 worksheets showing the steps in certain methods of computation.

Workers in applied research who wish to use modern econometric methods will find both of these books valuable reference sources. The examples, particularly those in the textbook by Klein, should be studied with care. Readers who wish only a general introduction to this field can learn much by skimming over the more mathematical sections and reading with care only those sections that deal with basic assumptions and conclusions. *R. J. Foote*

Resource Conservation: Economics and Policies. By S. V. CIRIACY-WANTRUP. University of California Press, Berkeley and Los Angeles. 1952. 395 pages. $6.50.

THE ALREADY IMPRESSIVE SERIES of contributions that Dr. Wantrup has made to the field of resource economics is materially strengthened and expanded by this work. It presents a comprehensive and systematic economic rationale for analyzing problems of resource conservation in terms that provide a basis for formulating public programs and policy.

The author's conception of the problems is broad and the scope of issues treated is correspondingly extensive. He deals with the theory underlying private and social economics, the influence of social institutions and their potential for implementing and limiting conservation practices, direct and indirect tools of national and international conservation policy, and governmental organization for achieving conservation objectives. The variety of aspects covered necessitates the use of different levels of abstraction in order to emphasize segments he considers important for public policy decisions.

Primary attention is directed to the development of a better understanding of the economic and social forces that affect the use of resources over time, which is the main objective of the study. Conservation is defined in terms of any change in resource use in the direction of the future. Stress is placed on the implications of differences between the two principal resource classes, "stock resources" and "flow resources." The income or revenue maximization criteria applicable to any production or utilization function is used in defining the optimum state of conservation. This optimum is a distribution of resource use rates that will maximize the present value of future net revenues.

Resource economists will find the discussion of the economic and social issues in conservation stemming from differences between private individuals and society particularly stimulating. The treatment of these issues is among the more significant contributions made by the study. In dealing with the behavior of individual resource users, detailed attention is given to such economic forces as interest, uncertainty, and price, and to the economic effects of such social institutions as property, tenancy, credit, taxation, monopolistic market conditions, and economic instability.

The principal change required in a shift from private to social economics according to Dr. Wantrup is a reinterpretation of "revenues" and "costs" in terms that will be meaningful for social accounting. Major modifications needed include allowances for transfer items that have no net effect on social costs or revenues, extension of coverage to include extra market goods and services, and use of administrative values in the social weighing of effects. The author considers the treatment of uncertainty to be one of the more radical reformulations required by social economics.

Avoiding a condition of economic irreversibility for critical flow resources becomes the main concern of public conservation policy, and the basis for the primary objective of such policy as that of maintaining a safe minimum conservation standard or level.

Achieving objectives through the selection and coordinated application of appropriate tools is considered by the author as an integral part of the social economics of conservation. At this stage he focuses attention on implementing conservation policy at various governmental levels in the United States, although a chapter is devoted to international aspects.

The work was designed to reach groups with varying interests and backgrounds, including professional economists, legislators, and government administrators as well as general readers. To accomplish this, a two-level treatment is attempted. Readers who are not versed in economics are advised by the author to skip certain designated sections. Although much of the introductory material and most of the concluding part on implementing conservation policy may be understood by many general readers, the central core of the analysis is likely to prove difficult even for professional economists. The complex nature of most of the problems treated requires a rigorous presentation, and in spite of the author's efforts to simplify discussion it demands a considered reading. But economists who are interested in any phase of social valuation, and those who are concerned with resource economics in particular, will find the time and effort required to comprehend the analysis justified by the significant contributions it makes to a major underdeveloped area of knowledge.

Mark M. Regan

Woolen and Worsted Manufacturing in the Southern Piedmont. By JAMES A. MORRIS. University of South Carolina Press, Columbia. 1952. 197 pages. $5.00.

WOOLEN AND WORSTED MANUFACTURING is concentrated mainly in New England and the Middle Atlantic States. The rapid growth of wool manufacturing in the South in recent years has stimulated much interest among followers of the textile scene. New England, which has lost most of the cotton-manufacturing industry to cotton-growing States, is concerned about the possibility of the migration to the South of another important industry. The South welcomes the shift in wool manufacturing as a part of its industrial development designed to improve economic conditions in that region.

In the book here reviewed, the author attempts to give an unbiased answer to the question, "Why are woolen and worsted mills moving South?" As background for chapters dealing more specifically with developments in the South, he presents a brief history of the wool industry in the United States and of the manufacturing processes involved, along with a brief discussion of current problems relating to tariffs, competition, and technological changes.

Detailed information is presented to show developments, present status, and future possibilities for the wool-manufacturing industry in the Southern Piedmont. Influences of such factors as sources and availability of raw materials, labor supply, wages and productivity of labor, and other items of cost are considered in detail. The author reaches the conclusion that an overall comparison of the advantages and disadvantages of New England and the Southern Piedmont as to their suitability as locations for woolen and worsted manufacturing plants reveals a relatively favorable position for the Southern Piedmont, from both immediate and longer time viewpoints. Consequently, he states that it appears safe to predict that wool manufacturing will continue to expand in the Southern region.

Dr. Morris, an associate professor at the University of South Carolina, is thoroughly familiar with the textile industry in New England and the Southeast. The study of woolen and worsted manufacturing in the Southern Piedmont was made in connection with meeting the requirements for a doctorate degree at Harvard University. Although the author was handicapped by lack of adequate information, he has made a significant contribution to an outstanding problem of the wool industry.

L. D. Howell

The Farmers' Movement, 1620-1920. By CARL C. TAYLOR. American Book Company, New York. 1953. 519 pages. $5.50.

THE THESIS OF THIS WORK, the product of scholarly research extending over many years, is stated by the author as follows: "The farmers' movement evolved out of and still revolves around the issues of prices, markets, and credits." The movement, according to Dr. Taylor, is as old as commercial agriculture in the United States. But it is composed of fluctuating relationships that are not easy to analyze; therefore the author deemed it necessary to present the story of several episodes in the movement before attempting to analyze their common economic and social pattern.

Down the 300 years from 1620 to 1920, he tells us, all the upheavals of the farmers' movement—the violent revolts, the giant parades, the formal farmers' organizations, the agrarian political parties—dealt with the same issues. Agriculture had lagged in its adjustment to the evolving price and market economy. By organized effort, farmers were struggling to catch step with the economy—so Dr. Taylor argues.

You see the thread of the farmers' movement in such episodes as the plant-cutting riots of colonial Virginia in 1682, and, during the early years of the Republic, in such revolts as Shays,' the Whiskey, and Fries' rebellions. You follow it through Jeffersonian agrarianism and, in bolder relief, in the political upheaval of the Jacksonian revolt. But the import of the movement as class-conscious mass pressure does not reveal itself fully until the period of the rise of third parties, in the 1870's.

During the 1870's the movement of farmers for control of the railroads and for economic cooperation captured the Grange, which had started as an anti-horsethief association in one place, as a debating club in another. After that, the story of the farmers' movement is an account of farmers' organizations in politics. Dr. Taylor takes us through the Granger movement and the Populist revolt, describing their policies, their objectives, and the issues which animated these organizations, relating them to the main stream of the farmers' movement. Likewise he chronicles the origins and programs of the Farmers' Union, Equity, the Nonpartisan League, and the farmers' cooperatives, linking these also with the movement.

Dr. Taylor credits Thorstein Veblen with the germ of the idea for his thesis, but it was the work of John R. Commons, *The History of Labour in the United States*, that furnished the final component of his concept of a farmers' movement. Commons, the institutional economist, saw "the evolution, more or less clear, of the economic conditions and social and political philosophies, which, like streams from different sources, have formed the labor movement of the 20th century."

It is in this sense that Dr. Taylor sees the farmers' movement—in a main stream of evolution, derived from various sources, flowing through various channels. Structuring the movement is a concomitant pattern of ideologies, philosophies, and sentiments.

His thesis is supported with an impressive

array of facts. As Dr. Taylor acknowledges in an 8-page bibliography, much of his data may be found elsewhere. But he has embellished his own pages with significant and vivid new material gleaned from fugitive sources in a score of libraries across the country.

Dr. Taylor has been with the United States Department of Agriculture since 1934, first with the Agricultural Adjustment Administration, then with the Resettlement Administration and BAE. In 1952 he resigned as head of the Division of Farm Population and Rural Life in BAE to join the Foreign Agricultural Service.

Students of social, economic, and political forces that have shaped national farm policies will find Dr. Taylor's work a valuable source book. For all of us who are engaged in research or related work in agricultural economics the book makes good reading because it helps us to understand how our separate and specialized activities fit into the great social structure of our rural life. His readers will look forward to the completion of his study of the farmers' movement from 1920 forward.

Charles E. Rogers

Farm Policies of the United States, 1790-1950. By MURRAY R. BENEDICT. The Twentieth Century Fund, New York. 1953. 548 pages. $5.00.

THIS HISTORICAL SURVEY and analysis of farm policies of the Federal Government from 1790 to 1950 is the first one-volume study to cover the entire period. It is a valuable contribution to the fields of agricultural history and agricultural economics. The book should be of interest, as Dr. Benedict suggests in the introduction, to those who are directly concerned with making farm policy and should provide college students with a "more adequate foundation for their study of current farm problems."

This book is to serve as a companion study to a forthcoming Twentieth Century Fund study, under the direction of Dr. Benedict and Dr. O. C. Stine, designed to give "the general public an impartial, over-all picture of the vast governmental operations in the field of agriculture and of their causes and effects."

Dr. Benedict in his survey of past farm policies does not attempt to draw definite conclusions concerning the value of present programs or the future need for governmental assistance to farmers. However, in his introductory chapter he states that "it is imperative that we gain perspective and seek to understand whether we are trying to restore a world that existed a century ago, or to adapt ourselves realistically to one that exists today."

The book presents a well organized and detailed description of Government programs and of farm organization activities in a changing economic setting. Because of the author's standing in the field, his discussion of tariff policies, fiscal policies, and government programs affecting agricultural prices will be of special interest to economists.

One of the main values of the work lies in its well-integrated economic background material. But it fails to include equally well-integrated material on the political process. This is particularly noticeable in the latter part of the book.

The tendency to ignore the political process in the discussion of organizational and program changes in the period after 1936 gives the reader an unbalanced and sometimes erroneous impression of the factors related to these changes. The discussion of organization and of organizational changes is particularly weak. These are occasionally inserted in the discussion of program changes and are seldom followed through sufficiently to give an adequate picture of the changing pattern of or-

ganization or of the factors related to the changes. For example, the establishment of the Agricultural Labor Administration is mentioned in passing but no information is given to indicate that this organization never really functioned and was replaced in a short time by the Office of Labor. This failure to follow through on organizational changes is also made occasionally with respect to specific programs. For example, Dr. Benedict mentions the announcement of a $100,000,000 incentive payment program, January 1943, but does not mention that the program was abandoned because Congress did not appropriate funds for it.

If the book is to be used as a comprehensive historical study rather than as an economic analysis of changing governmental policies it is weak in source materials for the period following 1930. Throughout the book Dr. Benedict tends to rely on a limited number of generally accepted reference books. The results are satisfactory for the earlier period in which well-balanced reliable published materials are available. Apparently the more limited accounts available for the later period were not always consulted. In any event the published materials should have been supplemented more adequately by documents and interviews. Inclusion of a bibliography would have increased the value of the book for research workers and students.

These are not major defects in a work of this scope and size as they do not seriously affect the reader's impression of developments over a period of 160 years. But they do decrease its usefulness as a historical reference for the last 20-year period covered in the volume. Nevertheless, this book should stimulate analysis of present governmental policies and programs in the light of historical perspective and it should be of use as a reference work for college students and research workers interested in agriculture.

Gladys L. Baker

The Harvest Labor Market in California. By LLOYD H. FISHER. Harvard University Press, Cambridge, Massachusetts. 1953. 190 pages. $4.50.

LLOYD FISHER was on the staff of the Bureau of Agricultural Economics from 1940 to 1943. His death in February this year at the age of 41 cut short a tremendous urge to make a rational analysis of the seasonal farm labor field and to discover what measure of orderly operation might be brought to it. The present volume, his Ph.D. thesis prepared at Harvard in 1949, goes far toward accomplishing his first purpose. It breaks into new economic territory by analyzing the fundamental forces underlying the seasonal farm labor market in California. The generalizations, though, apply to many other seasonal areas in the United States.

Several years of experience on the research staff of the CIO influenced parts of Fisher's analysis. For example, he characterizes the seasonal labor market as "structureless," and to some extent intentionally "unstructured." Such a market he defines as one in which virtually any type of labor can be hired to fill any of the jobs to be done. There are no rules as to seniority, preferential hiring, or division of labor; no hierarchy of jobs to reward the more proficient. Urban employees, farmers, housewives, and students crowd into this market or leave it as opportunities in their own fields dictate. Fisher's analysis is not dominated by any union bias, however, and he freely points to restrictive practices of labor unions as among the factors that hold labor in this insecure field of employment.

He points out that the situation in the harvest labor market in California is not primarily a matter of size of farm nor of absentee

ownership. It arises out of local specialization in crops with intensive harvest-labor demands. As these demands overlap in unpredictable ways and as most of the crops are perishable, farmers make sure that the labor supply is ample.

Fisher points to the labor contractor as the central figure in the seasonal labor market. He brings workers and jobs together and relieves the farmer of all relations with the laborer who handles his crops. As Fisher sees it farmers are not willing to renew this relationship, hence prefer the labor contractor to the free public employment office. Furthermore the labor contractor provides some insurance against unionization in that he provides leadership to workers which is congenial to employers. Fisher believes that if trade unions are to play much part in the seasonal labor picture, they will need to take over many functions now performed by labor contractors.

Fisher cites evidence presented to the La-Follette Committee and at various wage hearings to show the proliferation of organizations and gentlemen's agreements among California farm employers to "stabilize" farm wages and maintain control over the market situation. He also indicates that growers have made use of Government programs of wage stabilization and importation of foreign labor to control wage rates.

The author is particularly skeptical of the role that government can play in giving aid in the situation. He recounts a list of more than 50 occasions when special committees have set forth programs to help migratory farm workers. Fifteen of these reports were by Federal committees. Yet while the government rediscovered the facts year after year, farm employers had built up such strong barriers to government interference that nothing could be accomplished. Fisher concludes that these organizations are so strong that the farm worker has little chance to secure the resources of government to obtain any objectives he may have.

Fisher likewise sees no immediate prospect for unionization. A solution, if any, lies in the long-range contraction of the farm labor force by the increase of farm mechanization. These conclusions follow logically from his orderly analysis; yet it is hard to believe that he really meant to heed them. His basic belief in the dignity of all men allied his sympathies with disadvantaged groups without regard for the immediate prospects of their economic progress.

William H. Metzler

Catalogue of Economic and Social Projects of the United Nations and the Specialized Agencies. International Documents Service, Columbia University, New York. 1953. 138 pages. $1.50.

THIS PUBLICATION lists, describes, and indexes the work of the secretariats of the United Nations and specialized agencies in economic and social fields, including studies and surveys as well as technical services and operational activities. It describes the work in progress during 1952, including work initiated during the year, as well as continuing projects carried over from previous years and described in earlier issues. It indicates work to be continued in 1953 or authorized by the beginning of the year as part of the 1953 work program.

Selected Recent Research Publications in Agricultural Economics Issued by the Bureau of Agricultural Economics and Cooperatively by the State Colleges [1]

ARMORE, SIDNEY J. THE DEMAND AND PRICE STRUCTURE FOR FOOD FATS AND OILS; WITH EMPHASIS ON ANALYSES DESIGNED TO MEASURE THE EFFECTS OF INCREASED YIELDS OF COTTONSEED OIL ON PRICES AND TOTAL RETURNS. U. S. Dept. Agr. Tech. Bull. 1068, 69 pp., illus. June 1953. (RMA)

Two types of demand exist for most fats and oils. One has to do with the minimum amounts or proportions that manufacturers believe must be used to give the standardized products they want. The other has to do with the remaining requirements for fats and oils. In the users market, shortening, margarine, cooking and salad oils, mayonnaise and salad dressings, lard, and butter compete with each other. But in the manufacture of these products, competition is almost wholly among food fats and oils other than butter and lard.

ASKEW, WILLIAM R., and BRENSIKE, V. JOHN. THE MIXED-FEEDS INDUSTRY. U. S. Dept. Agr. Market. Research Rpt. 38, 24 pp., illus. May 1953. (RMA)

This report is intended to bring together all the available data concerning the mixed-feeds industry which are essential to an overall analysis of marketing costs and efficiency in the industry.

BITTING, H. WAYNE. PRODUCE DEPARTMENT SPACE UTILIZATION, GROSS MARGINS, AND OPERATING COSTS IN SELECTED RETAIL STORES IN CHARLOTTE, N. C., JANUARY 22-MAY 19, 1951. U. S. Dept. Agr. Market Research Rpt. 36, 38 pp., illus. June 1953. (RMA contract report; Alderson and Sessions collected data.)

Stores doing the larger volume of business had roughly twice the dollar sales per square foot of floor space in the grocery and meat departments that the smaller stores had, but this did not hold true for fresh produce. In the smaller stores sales of fresh produce were high relative to sales of groceries and meat.

BOGUE, DONALD J., and BEALE, CALVIN L. ECONOMIC SUB-REGIONS OF THE UNITED STATES. U. S. Bur. Census – BAE. Ser. Census – BAE 19, 47 pp., illus. June 1953.

Economic subregions are a new kind of area for reporting and analyzing statistical data.

BURNIGHT, ROBERT G., MCKAIN, WALTER C., JR., and PUTNAM, PAUL L. REGULAR HIRED WORKERS ON COMMERCIAL DAIRY FARMS IN CONNECTICUT, APRIL 1950-APRIL 1952. Conn. (Storrs) Agr. Expt Sta. Bull. 267, 40 pp. January 1953.

Contains information about the composition of the labor force, conditions of employment, and factors related to labor turnover, obtained from 345 dairy farm operators with 20 or more dairy cows.

CRECINK, JOHN C., and BURDICK, R. T. FARM RENTAL ARRANGEMENTS, NORTHEASTERN COLORADO IRRIGATED AREA. Colo. Agr. Expt. Sta. Bull. 424-A, 53 pp., illus. March 1953.

Of the 201 tenants in this study, 148 paid a share of the crop only, 31 paid some cash in addition to a share of the crop, 18 paid both livestock-share and crop-share rent, and 4 paid only cash rent for their farms.

DWOSKIN, PHILIP B. MILK PRODUCTS: CONSUMER PURCHASE PRODUCTS AND USE, MEMPHIS, TENN. U. S. Dept. Agr. Market. Research Rpt. 39, 68 pp., illus. May 1953. (An RMA contract rpt.)

The report indicates that part of the decline in sales of fresh fluid milk in the Memphis market resulted from substitution of nonfat dry milk solids for fresh milk products, although other factors also operated to reduce sales of the fresh product. But many consumers have substituted the dry product for the fresh in cooking and baking and some have used it as a substitute for or a supplement to fresh milk for drinking.

ENGELMAN, GERALD, DOWELL, AUSTIN A., and OLSON, ROBERT E. RELATIVE ACCURACY OF PRICING BUTCHER HOGS ON FOOT AND BY CARCASS WEIGHT AND GRADE. Minn. Agr. Expt. Sta. Tech. Bull. 208, 51 pp., illus. June 1953. (RMA; BAE cooperating.)

Among other things, this bulletin compares the pricing accuracy of the live weight, the live weight and grade, and the carcass weight and grade methods of marketing butcher hogs.

FOLSOM, JOSIAH C., compiler. MIGRATORY AGRICULTURAL LABOR IN THE UNITED STATES. AN ANNOTATED BIBLIOGRAPHY OF SELECTED REFERENCES. U. S. Dept. Agr. Library. Library List 59, 64 pp. May 1953.

Lists principally publications concerning migratory agricultural workers who habitually follow crops and obtain farm work mainly by their own efforts.

FOOTE, RICHARD J. STATISTICAL ANALYSES RELATING TO THE FEED-LIVESTOCK ECONOMY. U. S. Dept. Agr. Tech. Bull. 1070, 41 pp., illus. June 1953. (RMA)

Four related analyses were developed which together describe the principal economic forces that affect the feed-livestock economy during the period when marketings of corn are heaviest. They indicate factors that affect (1) the price of corn from November to May; (2)

[1] Processed reports are indicated as such. All others are printed. State publications may be obtained from the issuing agencies of the respective States.

the number of animal units fed in the October to November marketing year; (3) production of livestock and livestock products; and (4) prices of livestock and livestock products.

FUHRIMAN, WALTER U., BLANCH, GEORGE T., and STEWART, CLYDE E. ECONOMIC ANALYSIS OF AGRICULTURAL POTENTIALS OF WEBER BASIN RECLAMATION PROJECT, UTAH. Utah Agr. Expt. Sta. Special Rpt. 7, 39 pp., illus. Logan. December 1952. (BAE cooperating.)

Describes the farm organization and the farm economy that are likely to develop if project water is made available, and estimates the probable return to water and project capital if water is applied to land within the project area.

GARROTT, WILLIAM N. MARKETING CHARGES FOR ONIONS SOLD IN PITTSBURGH, PA., DECEMBER 1949-JUNE 1950 AND IN CLEVELAND, OHIO, FEBRUARY-JUNE 1950. 20 pp., illus. Bur. Agr. Econ. June 1953. (RMA)

Retail charges for selling onions in sample stores in these two cities averaged nearly 3 cents a pound and accounted for between 35 and 40 percent of the consumer's dollar.

GARROTT, WILLIAM N. MARKETING CHARGES FOR SWEETPOTATOES SOLD IN PITTSBURGH, PA., DECEMBER 1949-JUNE 1950, AND IN CLEVELAND, OHIO, FEBRUARY-JUNE 1950. Bur. Agr. Econ. 31 pp., illus. 1953. (RMA)

Charges for marketing sweetpotatoes from f.o.b. shipping points in Louisiana and New Jersey in 1949-50 accounted for 45-48 percent of their price in retail stores in the two cities. In Pittsburgh, the retail margin averaged 3.1 cents a pound; in Cleveland 2.8 cents.

HOOFNAGLE, WILLIAM S., and SAMUELS, J. K. ACQUIRING CITRUS FRUIT FOR CONCENTRATING BY PROCESSORS IN FLORIDA. U. S. Farm Credit Admin. Misc. Rpt. 113, 15 pp., illus. May 1953. (RMA, BAE cooperating.)

Describes the various methods of paying for Florida citrus used for processing concentrated juices.

HURD, E. B., and BROUGH, O. L., JR. GROSS FARM INCOME IN THE WHEAT-PEA AREA OF WASHINGTON AND IDAHO, 1935 TO 1950. Wash. Agr. Expt. Sta. Cir. 213, 63 pp., illus. March 1953. (BAE cooperating.)

In addition to a historical analysis of gross farm income, this publication shows the relationship of gross farm income to those factors that affect farm income, such as size of farm, land use, crop yields, livestock numbers, and prices received by farmers.

IBACH, D. B. and MENDUM, S. W. DETERMINING PROFITABLE USE OF FERTILIZER. U. S. Bur. Agr. Econ. F.M. 105, 70 pp., illus. June 1953. (Processed.)

Procedures are given to illustrate a way of handling the problems of (1) ascertaining the additional rates of application and (2) relating crop response to changes in prices and costs, thus finding the most profitable use of fertilizers over a wide range in economic conditions.

JOHNSON, DEHARD B. MARKETING CHARGES FOR GRAPEFRUIT SOLD IN PITTSBURGH, PA., AND CLEVELAND, OHIO, 1949-50 SEASON. 31 pp., illus. Bur. Agr. Econ. June 1953. (Processed.) (RMA)

During the period of the study, marketing charges accounted for 60 to 64 percent of the consumer's dollar spent for grapefruit in the two cities.

JOHNSON, DEHARD B. MARKETING CHARGES FOR LEMONS SOLD IN PITTSBURGH AND CLEVELAND, 1949-50 SEASON. 22 pp., illus. Bur. Agr. Econ. 1953. (RMA)

These marketing charges totaled $8.67 a box and accounted for two-thirds of the average cost to consumers.

JOHNSON, GLENN L., and HAVER, CECIL B. DECISION-MAKING PRINCIPLES IN FARM MANAGEMENT. Ky. Agr. Expt. Sta. Bull. 593, 43 pp. January 1953.

Summarizes some of the decision-making principles that have been developed and illustrates the usefulness of such principles to farmers.

LANHAM, BEN T., JR., YEAGER, J. H., and ALVORD, BEN F. ALABAMA AGRICULTURE; ITS CHARACTERISTICS AND FARMING AREAS. Ala. Agr. Expt. Sta. Bull. 286, 118 pp., illus. May 1953. (BAE cooperating.)

Replaces earlier bulletin. Covers the significant changes that have occurred in the agriculture of the State since the early thirties.

MCELVEEN, JACKSON V., and BACHMAN, KENNETH L. LOW-PRODUCTION FARMS; THEIR LOCATION AND LEVELS OF PRODUCTIVITY. U. S. Dept. Agr. Agr. Inform. Bull. 108, 87 pp., illus. June 1953.

The two kinds of low-production farms—the small commercial farms and the part-time and residential units—are analyzed, with emphasis on the small commercial farms.

MARKET RESEARCH CORPORATION OF AMERICA. ESTABLISHING A NATIONAL CONSUMER PANEL FROM A PROBABILITY SAMPLE. U. S. Dept. Agr. Market Research Rpt. 40, 28 pp. June 1953. (RMA contract report.)

From a probability sample of 1,120 selected dwelling units in New York City, 993, or 58 percent, agreed to cooperate. Eleven percent were not contacted for a variety of reasons.

MOTHERAL, JOE R., METZLER, WILLIAM H., and DUCOFF, LOUIS J. COTTON AND MANPOWER—TEXAS HIGH PLAINS. Tex. Agr. Expt. Sta. Bull. 762, 51 pp., illus. May 1953.

Analyzes the effects on manpower of the transition from hand labor to use of machines in this area.

NADEN, KENNETH D., and JACKSON, GEORGE A., JR. SOME ECONOMIC ASPECTS OF RETAILING CHICKEN MEAT. Calif. Agr. Expt. Sta. Bull. 734, 129 pp., illus. 1953. (RMA, BAE cooperating.)

More chicken meat could be sold in the Los Angeles area if it were made easier for retailers to handle and consumers to buy and if both groups could have more confidence that they will get the quality they want. Marketing losses could be reduced by faster turnover and more careful handling.

PASCHAL, JAMES L. ECONOMIC ANALYSIS OF ALFALFA YIELD RESPONSE TO PHOSPHATE FERTILIZER AT THREE LOCATIONS IN THE WEST. U. S. Bur. Agr. Econ. F.M. 104, 59 pp., illus. June 1953. (Processed.)

Results indicate that for purposes of economic analysis, rate experiments for alfalfa in irrigated areas should include rates of 600 to 800 pounds of P_2O_5 per acre, in most instances. No fewer than 4 and preferably 6 rates are suggested.

POULTRY MARKETING TECHNICAL COMMITTEE. COMMERCIAL HATCHERY OPERATIONS IN SIX SOUTHERN STATES. Southern Cooperative Ser. Bull. 34, 42 pp., illus. July 1953. (RMA; Agr. Expt. Stas. of Ala., Ark., Ga., La., Miss., S. C., Tenn., Tex., & Va. and BAE cooperating.)

Discusses the growth and development of the hatchery industry; its size and capacity; where it gets its eggs; price differentials between hatching and market eggs; and costs of producing market eggs.

PURCELL, MARGARET R. LENGTH OF HAUL TO LEADING MARKETS BY MOTORTRUCK, 1941 AND 1950. SELECTED FRUITS AND VEGETABLES. 62 pp. Bur. Agr. Econ. June 1953. (RMA) (Processed.)

Although many factors apparently favor long-distance movement of fresh produce by highway, truck hauls of many fruits and vegetables are relatively short, the average length of haul for 10 fruits and vegetables varying from 200 to 500 miles. Because hauls are short, the proportion of total truck receipts moved to market from distant supply points is relatively small.

REED, ROBERT H., and CREEK, C. RICHARD. FAMILY CONSUMPTION OF CERTAIN FRESH VEGETABLES IN HONOLULU. Hawaii Agr. Expt. Sta. Agr. Econ. Bull. 5, 22 pp., illus. June 1953. (BAE cooperating; RMA)

Family consumption of all vegetables, except head cabbage, increased as family incomes increased; it increased as size of family increased; and it varied among racial groups.

REUSS, LAWRENCE A., and BLANCH, GEORGE T. UTAH'S LAND RESOURCES. Utah Agr. Expt. Sta. Special Rpt. 4, 66 pp., illus. June 1951. (BAE cooperating.)

Contains information concerning the extent, location and character of Utah's land resources: Who owns the land; how it is used; what have been the trends in land use, ownership and development of resources; and what is the outlook for the future.

SIMON, MARTIN S. SOYBEANS: ECONOMIC ANALYSES RELATING TO PROCESSING. U. S. Dept. Agr. Market. Research Rpt. 35, 46 pp., illus. May 1953. (RMA)

Analyses were developed to consider: (1) The factors that affect prices of fats and oils, other than butter and lard, used in food products; and (2) the effect of changes in the value of products obtained per bushel of soybeans processed on the season-average price of soybeans.

STRAND, EDWIN G. FARMING ALTERNATIVES FOR POTATO GROWERS ON THE EASTERN SHORE (VIRGINIA-MARYLAND). U. S. Dept. Agr. Agr. Inform. Bull. 102. 95 pp., illus. June 1953. (RMA)

In the last 20 years production of early commercial potatoes on the Eastern Shore declined by about half while in the country as a whole it approximately doubled.

STRICKLER, PAUL E., and COOPER, MARTIN R. HARVESTING HAY AND STRAW AND USE OF BALERS. U. S. Bur. Agr. Econ. F.M. 107, 30 pp. June 1953. (Processed.)

Contains historical information on methods of harvesting hay as well as descriptions of newer machines and methods.

TEMPLE, FREDERICK C. COTTON AND COTTONSEED MARKETING. RELATED PRODUCTION PRACTICES AMONG NEGRO FARMERS IN RED RIVER DELTA AREA OF LOUISIANA, 1951 SEASON. Bur. Agr. Econ. 55 pp., illus. June 1953 (RMA contract report.) (Processed.)

It was believed that by appraising the existing marketing functions of transportation, ginning, storing, and selling, recommendations might be developed that would improve marketing practices for these products which in turn should make possible an increase in net farm income.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. CROP PRODUCTION PRACTICES. LABOR, POWER, AND MATERIALS, BY OPERATION. APPALACHIAN, SOUTHEAST, AND MISSISSIPPI DELTA. U. S. Bur. Agr. Econ. F.M. 92, sec. 3, 193 pp., illus. May 1953. (Processed.)

The information presented for each of 16 crops in each

type-of farming area was obtained from approximately 30 to 90 farmers through personal interviews.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. FIBERS: OPINIONS AND PRACTICES AMONG MANUFACTURERS OF CORDAGE AND TWINE. U. S. Dept. Agr. Market. Research Rpt. 51, 98 pp. June 1953. (RMA contract report.)

Sisalana, cotton, lint and waste, and abaca account for almost three-fourths of the total number of pounds of fibers used in making cordage products. Farm ropes and twines, industrial cords and twines, household twines, and marine cordage account for varying proportions of all fibers used.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. TASTE TESTS ON CANNED ORANGE JUICES. 20 pp., illus. Washington, D. C. June 1953. (RMA) (Processed.)

Tests showed that 4 of a set of 55 canned orange juices could be distinguished as to sweet-sour quality.

UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS AND FARM CREDIT ADMINISTRATION. BUYER PREFERENCE FOR CRANBERRY PACKAGING IN BOSTON AND TOPEKA. U. S. Dept. Agr. Market. Research Rpt. 34, 14 pp. May 1953. (RMA)

The study was made to find out whether consumers prefer to buy cranberries in 1-pound cellophane bags or in 1-pound boxes with windows. Results—consumers, free to choose either type of package, bought 3 cellophane bags to every window-box.

WOODWORTH, R. C., and BENEKE, R. R. ELECTRICITY IN FARM PRODUCTION, EASTERN LIVESTOCK AREA OF IOWA. U. S. Dept. Agr. Agr. Inform. Bull. 100, 51 pp., illus. May 1953. (Iowa Agr. Expt. Sta. cooperating.)

Electricity in this area replaces labor; permits the use of family, elderly, or partially handicapped workers; saves energy; improves the distribution of labor; aids in timing of production for both crops and livestock; reduces the risk inherent in farming; improves the quality of the products sold; and increases farm output.

Statistical Compilations

BRODELL, ALBERT P., and WALKER, HAROLD R. HARVESTING CORN FOR GRAIN. U. S. Dept. Agr. Statis. Bull. 129, 10 pp. June 1953.

BRODELL, ALBERT P., and KUZELKA, THOMAS J. HARVESTING THE SILAGE CROPS. U. S. Dept. Agr. Statis. Bull. 128, 23 pp. May 1953.

HOLMES, IRVIN, HARRELL, GEORGE D., STRONG, GEORGE B., MCKEEVER, LUCILE, and State statisticians, under the supervision of REGINALD ROYSTON. COMMERCIAL VEGETABLES FOR FRESH MARKET—ACREAGE, PRODUCTION, VALUE. REVISED ESTIMATES, 1939-50, BY SEASONAL GROUPS AND STATES. U. S. Dept. Agr. Statis. Bull. 126, 149 pp. May 1953.

HOLMES, IRVIN, HALL, THORLAND R., FROST, OAKLEY M., and State statisticians, under the direction of REGINALD ROYSTON. VEGETABLES FOR COMMERCIAL PROCESSING—ACREAGE, PRODUCTION, VALUE. REVISED ESTIMATES, 1918-50, BY STATES. U. S. Dept. Agr. Statis. Bull. 132, 108 pp. June 1953.

KIMBALL, E. SMITH, SMITH, PAUL W., and MOORE, ROBERT F., with the assistance of State Agricultural Statisticians, under the general direction of A. V. NORDQUIST. CHICKENS AND EGGS. MONTHLY EGG PRODUCTION, YOUNG CHICKENS AND LAYERS ON FARMS, AND RATE OF LAY, BY STATES AND GEOGRAPHIC DIVISIONS, 1925-44. REVISED ESTIMATES. U. S. Dept. Agr. Statis. Bull. 125, 127 pp. May 1953.

KIMBALL, E. SMITH, SMITH, PAUL W., and MOORE, ROBERT F. FARM PRODUCTION, DISPOSITION, AND INCOME FROM CHICKENS AND EGGS, 1909-44, BY STATES AND GEOGRAPHIC DIVISIONS. REVISED ESTIMATES. U. S. Dept. Agr. Statis. Bull. 133, 98 pp. July 1953.

KIMBALL, E. SMITH, SMITH, PAUL W., MOORE, ROBERT F., and State statisticians, under the general direction of A. V. NORDQUIST. FARM PRODUCTION, DISPOSITION, AND INCOME FROM TURKEYS: 1929-44, BY STATES AND GEOGRAPHIC DIVISIONS. REVISED ESTIMATES. 59 pp. Bur. Agr. Econ. June 1953. (Processed.)

LOWENSTEIN, FRANK. THE AMERICAN-EGYPTIAN COTTON SITUATION. U. S. Dept. Agr. Statis. Bull. 130, 38 pp. May 1953.

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